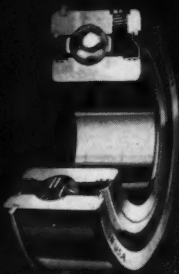


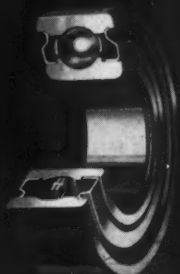
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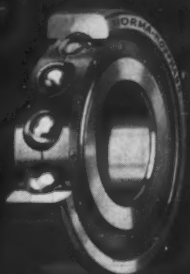
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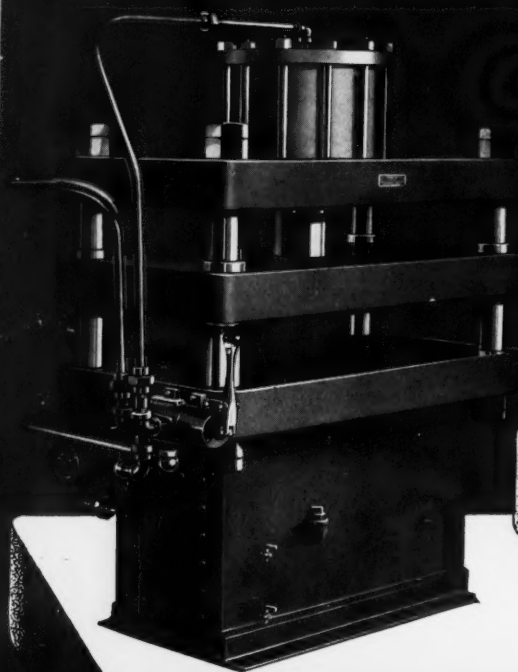
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MODERN Machine Shop

HOWARD CAMPBELL, Editor

Volume 10

JULY, 1937

Number 2

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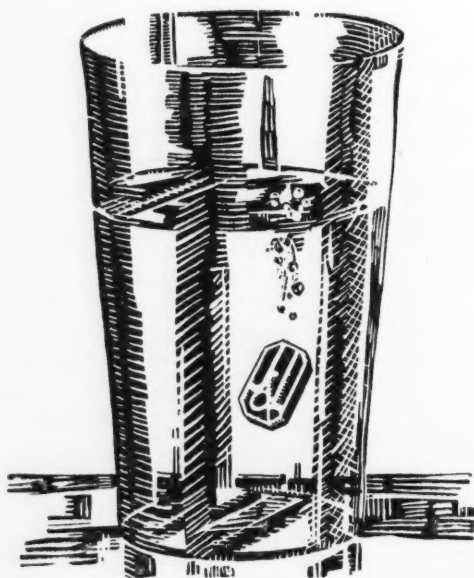
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MODERN Machine Shop

CINCINNATI, OHIO

JULY, 1937

VOL. 10, No. 2

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Method of Stocking and Re- working Tool Steel on Norfolk & Western Railroad Avoids Waste

BY HOWARD CAMPBELL

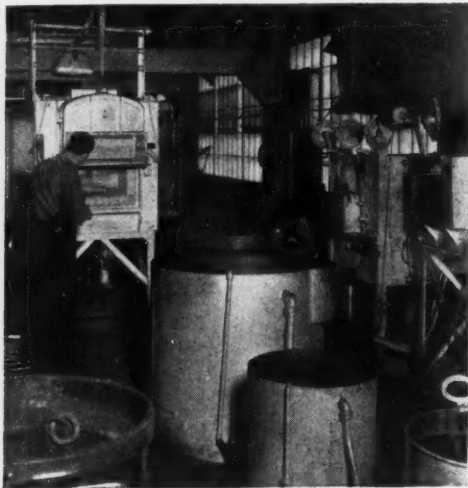
THE methods of stocking and reworking high speed tool steel on the Norfolk & Western Railway System have been reduced to a system that has proved both efficient and economical. While fourteen sizes of flat high speed steel bars, ranging in dimensions from $\frac{1}{4} \times 1$ in. to $1\frac{1}{2} \times 3$ in. are carried in stock, the greater part of the steel is procured in the $1\frac{1}{2} \times 3$ -in. size.

The steel is made up into tools of this size for the wheel lathes, heavy planers, large boring mills, and other heavy machine tools, and the tools are distributed to the various shops of the System upon requisition. As the tools wear down to a point where they are too short for further use, they are laid aside and periodically are gathered up and returned to the Roanoke Shops, where they are reformed to smaller sizes. They are then redistributed and the process is repeated.

A stub of a large tool will make a complete tool of a smaller size; thus as the tools wear down, they are re-



View showing part of the equipment in the heat treat department at the Roanoke Shops of the Norfolk & Western Railway.



View of the opposite end of the department, showing Hevi-Duty electric furnace.

forged and reused until there is nothing left but a stub of $\frac{3}{8}$ -in. square toolbit, which is the smallest size in use.

The size to which the stub is reformed depends, of course, upon the length of the stub. The sizes in use, however, and to which the tools are reformed when possible, are—in addition to the $1\frac{1}{2} \times 3$ -in. size in which the new steel comes— 1×2 in., $\frac{3}{4} \times 1\frac{1}{2}$ in., $\frac{5}{8} \times 1$ in., $\frac{3}{4}$ in. square, and $\frac{3}{8}$ in. square. The latter sizes are, of course, used in Armstrong and similar types of toolholders.

It is evident that most of the steel is reworked several times in the process of reducing it from $1\frac{1}{2} \times 3$ in. to $\frac{3}{8}$ in. square, and the question naturally arises as to what effect this reworking has on the quality of the steel. The answer is that as long as it is reworked properly and with a proper understanding of the temperatures at which such reworking can be done, the reworking has the effect of refining the grain of the steel and improving its quality. Under normal

conditions from 400 to 500 tools per month are reworked in this manner.

Considering that all of the tool forging, hardening, and tempering for the entire system is concentrated at Roanoke Shops, it is natural to expect that the heat treating equipment would be of the most modern type—and such is the case. The heat treat department is located on the balcony, away from the heavy machine operations on the main floor and at a point where the sensitive pyrometers and other instruments will be unaffected by surrounding activities.

The equipment includes one 6-burner gas furnace, two Westinghouse electric furnaces (one 13×28 and one 13×22 in.), one C. I. Hayes 10×14 -in. lo-Bar furnace, one Hevi-Duty 18×36 -in. electric furnace, one quenching bath (oil), and two gas-burning drawpots that were designed by N & W engineers and built in the



All tools are sandblasted after hardening, both as a cleaning operation and to disclose any cracks that may exist in the tools.

Roanoke shops. The gas and Westinghouse electric furnaces are controlled by Brown pyrometers, the Hayes furnace is governed by a Leeds-Northrup instrument, and the Hevi-Duty Electric furnace is equipped with a Brown potentiometer.

After the high speed steel tools have been forged in the smith shop to the required sizes, they are delivered to the heat treating department on the balcony floor. As many of them as can conveniently be handled are placed in one of the Westinghouse furnaces, where they are preheated for a period of approximately one hour, bringing them up to a temperature of about 1,000 degrees. They are then advanced to the second Westinghouse furnace, where they are further heated to a temperature of 1600 degrees. The next move is to the Hayes Glo-Bar furnace, where they are brought up to 2300 degrees. This is the maximum; at this point they are quenched in the oil bath to approximately 600 degrees and then are moved to the Westinghouse furnace



One of the special fixtures used for tool sharpening. This fixture can be adjusted to provide any radius desired. In the case shown a relief is being ground just back of the cutting edge of a double radius tool.

again, where the temperature is run up to 1050 degrees. They are held at



General view of tool grinding department.



Here is a cutter grinding machine into which an extension has been built so that cutters can be ground without removing them from their arbors. The idea has paid for itself many times over.

this temperature from one to five hours, depending on the job and the size of the tool, to relieve the strains set up in the quenching operation. The tools are now ready for sand blasting and grinding.

All tools are sand blasted before they are sharpened, the sand blast serving the double purpose of cleaning the tools and disclosing any defects. If a tool has been cracked in the hardening process, the crack will show up immediately upon sand blasting and the tool can be discarded before any more work is done on it.

All tool grinding is done by men who, by special training and experience, have become experts at this work. The tool grinding department, which is located adjacent to the heat

treat department, is equipped with a wide variety of tool grinding and sharpening equipment, and every kind of tool from a toolbit to a large inserted-tooth cutter for a planer-type milling machine is ground on a machine especially designed for the purpose.

The tools are handled in lots of convenient size, for purposes of economy, and as soon as a lot of tools is completed enough are selected to fill any requisitions that may be waiting and the rest are stored for further orders. Steel bins are provided in

which the tools are stored according to type and size; thus an order for new tools can be filled immediately.

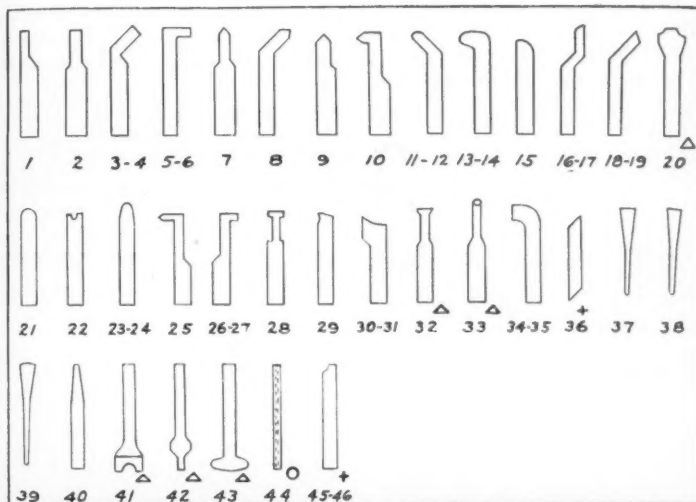
To expedite the ordering of tools, a standard practice sheet has been made up, copies of which are in the hands



One of the storage bins for finished tools.

of the master mechanic or superintendent at each shop on the System. The sheet shows the shapes of 46 different kinds of tools, each of which is identified by a number. Added to this

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SIZE	MACHINE	SIZE	MACHINE
A 5/8X17	LATHE	F 1K2X14	LATHE & PLANNER
B 1X17	BORING MILL	G 1 1/4X2 1/2X16	PLANNER
C 1 1/4X1 1/4X8	BORING MILL	H 1 1/2X2X3X9	AXLE LATHE
D 3/4X1 1/2X10	LATHE & SHAPER	I 1 1/2X3X18	WHEEL LATHE
E 1X1 1/2X10	LATHE & SHAPER	A-G (AT&G INC)	SLOTTER

NOTE: WHEN ORDERING SPECIFY NO. & LETTER

DESCRIPTION OF TOOLS	DESCRIPTION OF TOOLS
1 CUTTING OFF R.H.	26 T-SLOT R.H.
2 CUTTING OFF STRAIGHT	27 T-SLOT L.H.
3 CUTTING OFF 45° R.H.	28 T-SLOT STRAIGHT
4 CUTTING OFF 45° L.H.	29 FINISHING TOOL
5 CUTTING OFF 90° R.H.	30 AXLE LATHE R.H.
6 CUTTING OFF 90° L.H.	31 AXLE LATHE L.H.
7 STRAIGHT THREADING	32 SLOTTER
8 THREADING 45° R.H.	33 SLOTTER
9 THREADING R.H. OFF SET	34 FACING TOOL R.H. BOR. MILL
10 THREADING INTERNAL	35 FACING TOOL L.H. BOR. MILL
11 BORING R.H. BENT 45°	36 SQUARE TOOL BITS
12 BORING L.H. BENT 45°	37 HARD BRASS TOOL ST. EDGE
13 BORING MILL R.H.	38 HARD BRASS TOOL ANG. EDGE
14 BORING MILL L.H.	39 HARD BRASS TOOL END. NOSE
15 SHAPER TOOL	40 BRASS TOOL
16 SIDE TOOL R.H.	41 SHAPER
17 SIDE TOOL L.H.	42 SLOTTER
18 FACING R.H. 45°	43 SLOTTER
19 FACING L.H. 45°	44 ARMSTRONG CUT-OFF TOOL
20 R.H. L.H. RADIUS	45 WHEEL LATHE R.H.
21 FORMING ST. CONVEX	46 WHEEL LATHE L.H.
22 FORMING ST. CONCAVE	
23 ROUGHING R.H. NOSE R.H.	
24 ROUGHING R.H. NOSE L.H.	
25 BORING INTERNAL	

NOTE: GIVE ALL DIMENSIONS FOR NOS. 20, 32, 33, 41, 42, 43, WHEN ORDERING
 NOTE: GIVE NO. OF ARMSTRONG HOLDER FOR CUT OFF TOOL WHEN ORDERING
 NOTE: FOR PORTSMOUTH ONLY

NOTE
 NO. DENOTES KIND OF TOOL
 LETTER DENOTES SIZE
 WHERE THERE IS A RIGHT
 AND LEFT TOOL - RIGHT
 IS SHOWN
 * WHEN ORDERING NO. 36
 GIVE SIZE OF SQUARE

NEWRY STANDARD PRACTICES

DEPT. OF SMALL TOOLS

TOOLS - STANDARD
 FOR LATHE - SHAPER
 PLANNER - BORING MILL
 & SLOTTER

DATE REV. TRACED 4-28-33

VOLUME NO.
 SHEET NO. 1076
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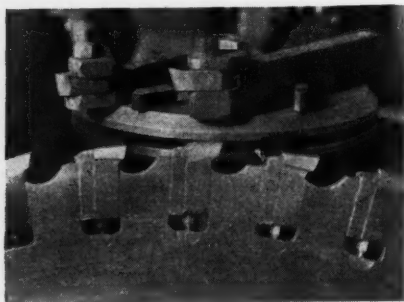
Copy of Norfolk & Western Standard Practice Sheet from which all forged tools are ordered.

is a series of symbols by letter from A to I to indicate the size of the tool and the kind of machine for which it

is intended. Tools are ordered both by letter and number; thus an order for a tool No. G23 would call for a rough-

ing round nose tool, right hand, for the planer.

Another source of supply for high speed steel consists in the Disston and Simonds cold saws that are used to cut heavy bar stock. These saws have inserted teeth of high speed steel, each tooth $\frac{3}{8} \times \frac{3}{8}$ in. in size, with a $\frac{1}{8}$ -in. kerf, and when the kerf becomes too badly worn, the tooth is unfit for further use in a saw. The grade of



When cold saw teeth are worn down too far for further use in the saws, they are clamped into the special holders shown here and used as lathe tools.

steel used in these teeth is excellent, however, and when the tooth can no longer be used in a saw, it is clamped into a special holder and used as a turning tool for a lathe or boring mill. When it is too short for further service in the holder, it is thrown in with the rest of the high speed steel scrap and reworked into a smaller toolbit.

In passing it might be mentioned that the heat treating department has many other tasks besides the tempering of lathe and planer tools. For instance, punches are made in thousands at the Roanoke shops, and these punches all have to be properly tempered. Dies for the entire system are also made and heat treated here.

Gripper dies comprise an important item for the heat treat department. These dies are first preheated to 1,200 degrees in one of the Westinghouse

electric furnaces and are then advanced to the second one where they are brought up to 1,400 degrees. They are then moved to the Glo-Bar furnace, where the temperature is raised to 1,850 degrees, and then they are hardened with an air blast. After hardening, the dies are drawn to 1,000 degrees in the preheat furnace and are held at this temperature for one hour.

Systematic planning of the type outlined above, made effective by the use of adequate equipment, comprises a concrete example of modern industrial efficiency.

Landis 6-In. and 10-In. Type C Plain Hydraulic Grinder No. D-37. Twenty pages of description of the Landis 6-In. and 10-In. Type C Plain Hydraulic Grinders are included in this catalog, which is now being issued by Landis Tool Company, Waynesboro, Pa. The book is profusely illustrated, containing not only illustrations of the complete machines in the various sizes, but also photographs of the individual units and mechanisms included in the assembly of the machine. There are several pages of illustrations showing the machines in use for grinding various types and kinds of jobs. The chapter headings are as follows: Landis 6-In. and 10-In. Type C Plain Hydraulic Grinder; Landis Solex Sizing; Grinding with the Wheel Base Set at an Angle; Grinding Motor Armatures and Armature Shafts; Multi-Wheel Grinding; Crank Pin and Eccentric Grinding; Crankshaft Line Bearing Grinding; and Miscellaneous. Tables of specifications are included. Copy free upon request.

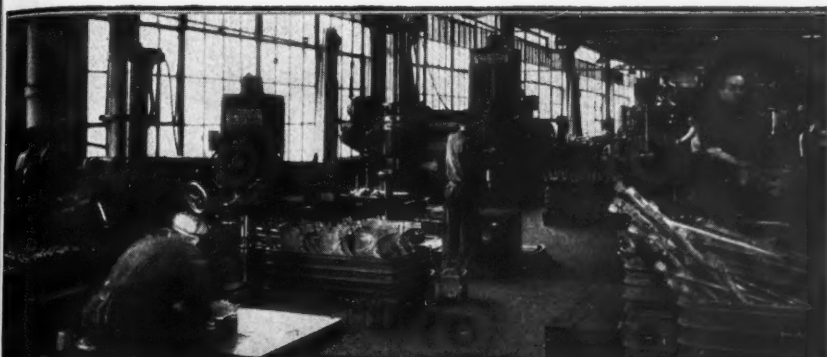
Whitman & Barnes Altercut Production Reamers. This four-page circular, now being issued by Whitman & Barnes, Detroit, Mich., presents the features of the Whitman & Barnes "Altercut" Production Reamers. Photographs of the reamer and blades, taken from different points of view, illustrate the design and construction of the reamer and the text explains the advantages of the particular type of construction used. The fourth page of the folder comprises a table of specifications and prices. Copy free upon request.

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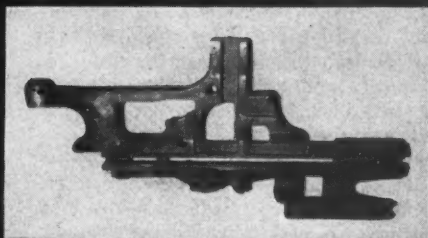
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● Fifteen months ago the Intertype Corporation modernized drilling, reaming and tapping operations on cast iron face plates for typesetting machines by installing five Super-Service Radials.

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If more and better work at lower cost per piece interests you, modernize drilling, tapping and reaming with Super-Service Radials. Write for detailed information.

THE CINCINNATI BICKFORD TOOL CO., OAKLEY, CINCINNATI, OHIO

Armco Apprentice Training Plan Develops Skilled Men

By EDGAR SCHELLENBACH

IT IS an ironic paradox that the total number of men on government relief rolls remains high in the millions while industry frantically but futilely combs the by-ways of the nation for skilled craftsmen. Personnel chieftains in industry are of one voice in declaring that no employment problem of today is more acute.

Naturally, some industries and some sections are affected more than others. Woes of the depression cast thousands of skilled workers adrift. During the five years of industrial retrenchment, many entered other professions from which they are now reluctant to part. And nature took its inevitable toll of older workers.

Everyone knows the result—an alarming dearth of skilled men to take over responsible plant positions in the face of a rising tide of prosperity. In fact, personnel supervisors declare that an adequate supply of skilled labor isn't available at any price.

Many inquiries were forthcoming last October when The American Rolling Mill Company expanded its apprentice training program. The new training program differs from that previously sponsored by the company in that the courses are conducted in cooperation with the International Correspondence Schools, of Scranton, Pa.

In a few words, the course is a definite outline of work and study, correlated by an individual who has the interests of the apprentice at

heart. It is accompanied by a graduated scale of pay for the four year period. At the end is the promise of a journeyman's ranking and the opportunity for promotion to a position of greater responsibility whenever the opportunity presents itself.

The program is under the direction of an apprentice supervisor in each plant. He maintains close personal contact with the individual apprentices and their problems, and is responsible for correlating studies with work in the shops. Textbooks and lesson papers are furnished and examinations are sent to the I. C. S. for correction.

Perhaps it should be emphasized here that Armco is recruiting its apprentices from the ranks of helpers and the employment reserve within the company. In keeping with an Armco policy, the company rarely if ever goes outside its own ranks to obtain men for training in skilled shop work. It has long followed the policy of promoting from within.

Young men selected for enrollment must be between 18 and 20 years of age, and must have a high school education or its equivalent. The present goal at the Middletown Division has been set at 100 apprentices. Applicants are interviewed and rated by a board of three men.

Simplicity is the keynote of the entire training course. It is scheduled to lead the student to the rank of skilled journeyman in his trade within

a period of four years, but where the apprentice shows particular aptitude for both the studies and the required work, he may be advanced to that rating long before expiration of the period.

Operating under the guidance of a foreman and an experienced worker, the apprentice is given to understand that everything he produces during shop hours is expected to be prime work. Armco has found this tends to promote increased interest in the job at hand, along with instilling in the individual confidence in his own ability.

Thus, the program fits in with Armco's general scheme of production. There is no waste motion chargeable either to the company or to the individuals. Four hours' study work at the plant each week is permitted on company time. The class is divided into three groups. From 8 a. m. to 12 noon on Tuesdays, Wednesdays and Thursdays, the groups study in a special classroom set aside for the apprentices. To complete their weekly program, at least 10 to 12 hours is required for home study.

The final hour of classroom study is generally devoted to a round table discussion. At each session a representative of one of the operating departments in the mill lectures on one of the various processes involved in the manufacture of iron and steel, and acquaints the young men with the different kinds of machinery that are required for each process.

Armco is placing much emphasis on personal contacts with the group. At regular intervals the supervisor discusses the program with each worker, makes certain that he is progressing satisfactorily with his lessons, and that he understands fully his prescribed work in the shop.

The total period of apprenticeship is estimated at 8200 hours for the

work schedule, and 800 hours for the study schedule. Each man will be routed from one trade operation to another to get all-round work experience during the scheduled period.

Studies by vocational experts have shown that many workmen in steel mills become skillful in the performance of their duties without knowing much about the science underlying them. The reason for doing things as they do frequently remains a mystery to them. The apprentice study course, however, precludes the possibility of such a situation, insofar as these boys are concerned.

The lessons are arranged for progressive study, each lesson preparing the student for the next in the series. In each lesson is contained the practical information the apprentice needs to fit himself for progressive moves in the steel mill proper.

The apprentice is required to spend certain specified periods on each type of work. For instance, the machine shop apprentice is started on general floor work. Since safety is a consideration of paramount importance in the handling of heavy machinery, the novice is first taught how to handle crane lifts, and the technique of attaching machinery to a crane. Armco deems it essential that he learn the safety routine of the shop under the guidance of an experienced worker.

After four months, the machine shop apprentice is assigned to lathe work. He is started on simple turning and facing jobs, followed with drilling, reaming and boring, and then with taper turning and threading. For each type of work, he must satisfy the foreman that he knows how to perform that particular kind of operation before he is assigned to another task.

Essentially, the company's machine shop is not a production shop, since much of the repair and other work

depends upon happenings in the company's mill. Therefore the company seeks to develop well-rounded craftsmen instead of specialists in certain fields.

For floor work and erection, including babbiting, is set aside a period of eight months; six months for the large lathe; four months each on the radial drill and planer; three months on the draw shaper and boring mill, and two months each for the boring bar and the millers and gear cutters.

The rigger shop apprentice has the following schedule: shop helper, radial drill press, sheet metal and plate work, riveting and bucking, and structural work, three months for each job. Four months are required for both gas and electric welding and work on the roll, shear and punch.

A period of six months is set aside for floor work and shop assembly, including steel body repair, tanks, special machines, guards, and so on. Seven months of the period have been assigned for lay-out, and twelve months for rigging, installation and erection.

Periods of 48 months have been set aside for apprentices working under experienced welders, pipe fitters, electric repair men, blacksmiths, round house, tin shop, carpentry, masonry, steel foundry, heat treaters, electrical construction and pattern shop employees.

There are also courses for apprentices in the mechanical and electrical maintenance departments, in addition to the power and boiler group.

In the course of study, the machine shop group, for instance, has preparatory studies in shop economics, elements of arithmetic, fractions, decimals weights and measures, ratio and proportion, powers and roots, mensuration, formulas and use of trigonometric tables. Further mathematical subjects are optional.

Required subjects for this course include mechanical principles, measuring instruments, elements of blueprint reading, drilling, engine lathes, turret lathes and lathe practice, planers and practice, shaper and slotter work, boring mill work, milling machines, gear calculations and cutting, grinding practices, bench work, hardening and tempering, heat treatment of low-carbon steels and erecting.

One of the features of all courses is a section devoted to the principles of good English.

Thus, the average apprentice will serve for a period of four years. But the program is sufficiently flexible to permit a particularly bright star to complete his apprenticeship in as short a time as two years. The field of 25 starters in the first class last October already is spread out to a considerable degree. Some, of course, are progressing faster than others in both the mill work and the assigned studies.

It is required that the apprentice complete two study assignments over a period of about three weeks. After each written lesson, he reports to the supervisor and in a private session they discuss the various problems in the assignment. The papers are then sent to I. C. S. headquarters for grading and record-keeping.

In this manner supervisors can make a constant check on the individual's advancement, find any weak spots that may develop, and make recommendations for special study in any phase of the work that he does not understand fully.

What has prompted Armco to place so much emphasis on its present program?

It is a published Armco policy to provide such training opportunities as will give the individual substantial aid to his advancement.

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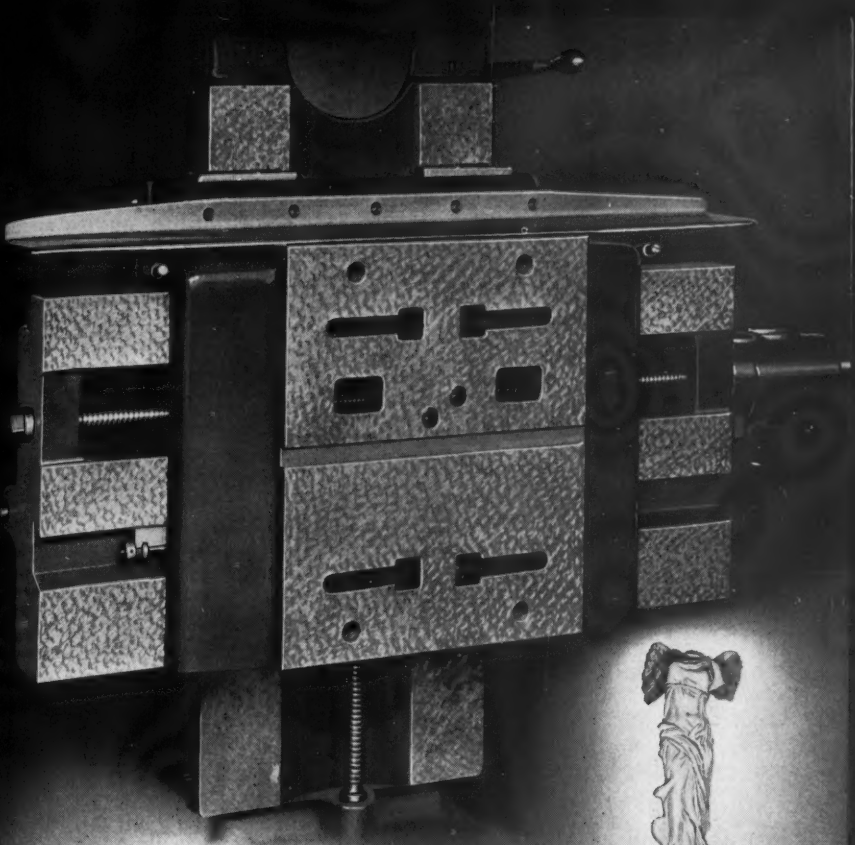
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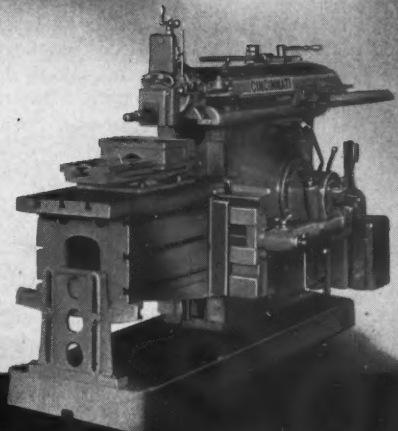
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The new wide apron bear-
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bring accurate, smooth
cutting on Cincinnati
Shapers.



THE CINCINNATI SHAPER COMPANY, CINCINNATI, OHIO

SHAPERS • SHEARS • BRAKES

policies, adopted by the board of directors in 1919, reads: "Armco has, through understanding, fair dealing and mutual confidence, endeavored to gather together a group of earnest, loyal and thoroughly trained men bound together by the enduring ties of mutual interest and opportunity, and their confirmed belief in their ability to succeed in their respective tasks."

Another in the set of eleven policies: "To make every possible effort to develop and maintain a contented, efficient, loyal, aggressive organization, who believe in their company, to whom work is a pleasure, and to whom extraordinary accomplishment is a personal ambition."

Therefore, groups of young men on the employment reserve lists are being given the opportunity to learn a trade. Since about half of the total number of employes in the maintenance departments alone are more than 45 years of age, replacements caused by ill-health, promotion, pensioning and death will be necessary. On the basis of statistics, the average work expectancy of the group is 12 years. The induction of a ratio of one apprentice for each three journeymen will provide just the necessary number of replacements within the next 12 years.

When the work expectancy of shop personnel is put at 20 years for those under 45 years of age, the entire personnel of a given unit will be replaced within that period by inducing a ratio of one apprentice for each five journeymen, when a four-year training program is established.

It is admitted that some shrinkage is likely while the training program is in progress. Therefore it is estimated that 70 per cent of the total number inducted for a four-year training session will still be found on the payrolls after a five-year period.

This 30 per cent loss, it has been found, is caused by resignations, transfers, ill health, and so on, either before or after the apprentice has finished his time. That is, approximately 143 apprentices will be required over a four-year period to develop 100 journeymen.

Obviously, all of the apprentices are not enrolled at one time. One-fourth of the number required are inducted each quarter. Where a part of the requirements are already on the job, the difference between present number and quota are employed on that basis. Replacements are made as apprentices are graduated and placed.

Armco has its program arranged whereby the apprentice, after he has completed the first six months' period, will be entitled to receive premiums for measured work on any job on which he has finished the prescribed number of weeks of training as specified in the program and approved by the Works Management.

Hourly rates of pay for all apprentices who are progressing satisfactorily in both work and study are increased every four months for the first two years of the course, and every six months the last two years of the course.

What does Armco hope for and expect of its apprenticeship training course?

An organization that is favorably apprentice conscious.

That the highest possible type of potential journeymen mechanics will be attracted.

To socialize the thoughts and actions of the group as a whole.

To promote team spirit and team action in the development of machine power.

To discover and develop potential leadership both for maintenance and production.

y, 1937

July, 1937

MODERN MACHINE SHOP 67

A SAW FOR EVERY METAL CUTTING JOB

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Revised Starrett Catalog No. 25MD gives complete information about the entire line of Starrett S-M Molybdenum, High Speed Steel and Tungsten Alloy Hacksaws. Write for a copy.

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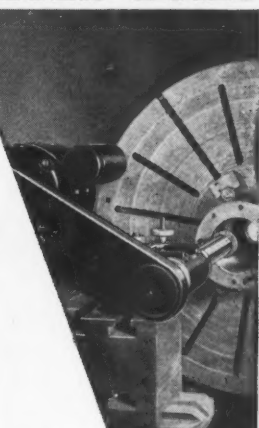
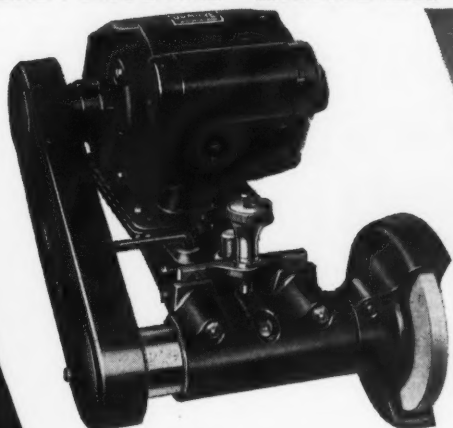
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July, 1937

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It's the "Chief"—a brand new 1 H.P. grinder especially built for heavy internal or external use where it is necessary to have a tool that can remove a large amount of stock and also be able to maintain precision tolerances of 1/10,000 of an inch. The "Chief" has a dynamically balanced constant speed A.C.—D.C. motor . . . totally enclosed . . . continuous duty, split tolerance bearings in both motor and quill and also the famous Dumore quill construction.* Six quills are available, five for internal work, one for external. Internal quills grind to a depth of 6, 12, 16, 20, and 24 inches. Quill speeds vary from 3,450 to 8,200 r.p.m., giving correct speeds to wheels from eight inches to three inches in diameter . . . Ask any Dumore distributor listed below for more detailed information on any Dumore tool—no obligation of course.

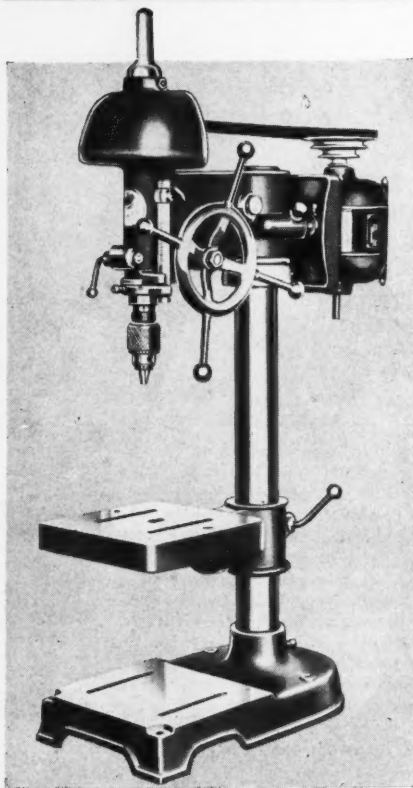
*U. S. Patent No. 1,859,068

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Engineered POWER TOOLS

limited their field of application.

To inspect a weld made in joining two steel plates—to assume a simple example—the first step is to magnetize the plates by placing two permanent magnets at the right and left of the seam. The magnets can also be joined together by a yoke. If the course of the field between the two

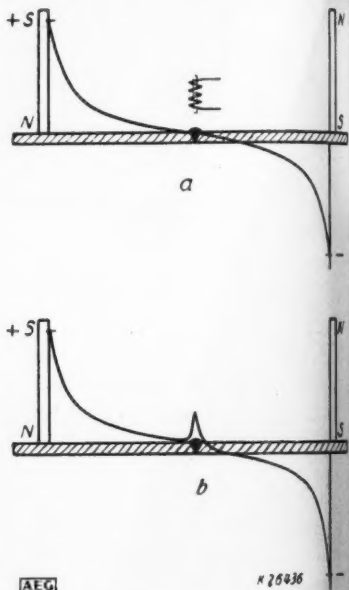
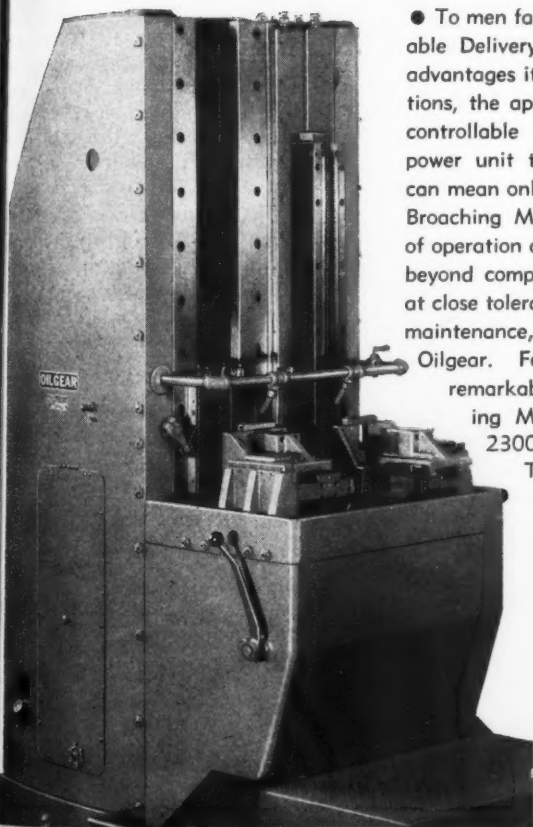


Fig. 2—(a) Chart record of a perfectly welded joint. (b) Chart record showing defect in welded seam.

magnets is plotted by means of an instrument, an undistorted curve is obtained if the welded joint is perfect. However, if there are defects such as bonding faults, shrink holes, cracks and so on, in the seam, additional stray fields will be set up which produce a distorted field curve.

To detect such defects, a search coil is moved to and fro in short movements at a certain speed in the field. A voltage is thus induced in the coil which corresponds to the

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alteration of the components of the magnetic field in the direction in which the coil is moved. If the field range is steady, which would be the case if the weld is perfect, the induced voltage in the coil remains uniform. Conversely, if there are defects in the welded seam, the voltage in the coil



Fig. 3—Probing Device. B—Sockets for connecting headphones. K—Head with search coil. M—Magnet for exciting of search coil.

varies in accordance with the variations in the solidity of the field.

Diagrammatically a defect in the weld will be represented on the chart by the appearance of a small peak in the field curve. The alteration in the shape of the curve is occasioned by the alteration in the amplitude and by the harmonics of the induced voltage. These electrical phenomena are rendered audible to the tester through the medium of headphones.

The head of the probing device includes a search coil which is set in vibration by a self-contained magnet connected to obtain across-the-line voltage. In order to be able to test not only simple butt and fillet seams, but also inconveniently positioned joints, the head of the probe is made adjustable so that the search coil can be moved in any desired direction relative to the operating magnet. The practical shape of the probe permits of testing welds in difficult locations where they would be impossible to test by other means. The long connecting cord — usually approximately

5½ yards long—gives the tester ample freedom of movement.

The weak tones produced by the current impulse induced in the search coil when testing are amplified in a valve connected across the lighting mains. Two sockets are fitted to the probe for connecting the headphones. The degree of magnetization produced by the two permanent magnets is comparatively weak but is entirely adequate to carry out all tests. All components of the testing outfit—the magnets, amplifier, headphones and cable connections—are lodged in a portable desk which, owing to its light weight (7¼ pounds), is very easily moved.

Power for operating the instrument is obtained from the lighting circuit, for which an extension cord and cable is supplied. The headphones are connected to the probe, and the probe, in turn, to two contact sockets on the desk. The amplifier is then switched

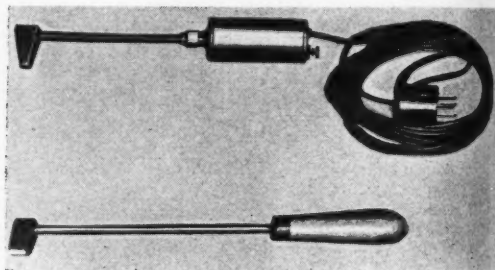
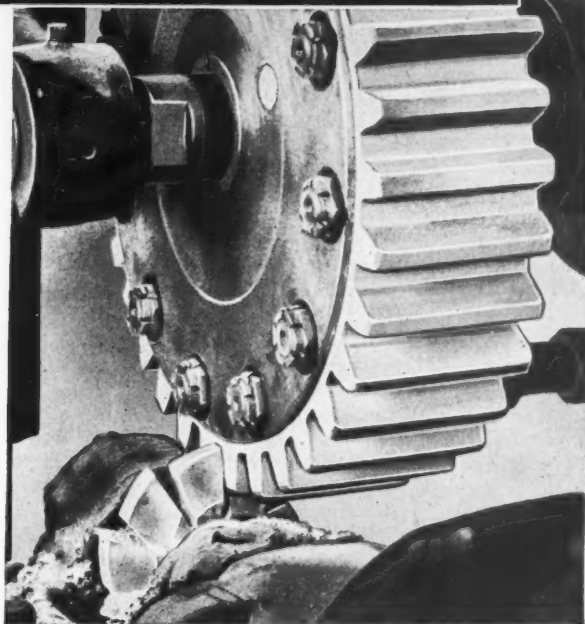


Fig. 4—Magnetic Probing Device.

in, and the instrument is ready to use as soon as the welded seam has been magnetized by the use of the two magnets. Upon guiding the probe slowly to and fro over the welded seam, defects in the weld are instantly located by the alteration of the volume and timber of the sound produced in the phones.

The magnetic testing method does

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THERE is no denying the fact that INSUROK silent plastic gears (non-metallic) deliver greater gear value per dollar invested. This is because INSUROK possesses in a higher degree those qualities of durability, toughness and wearability that insure longer life and freedom from costly, frequent replacements. Learn how the superior performance of INSUROK gears can be turned to the gear cutter's profitable advantage.

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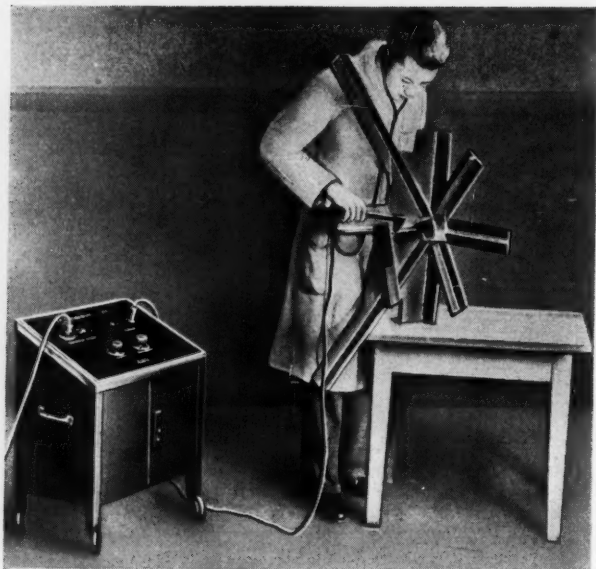


Fig. 5—Using magnetic testing outfit to inspect welds in steel construction.

not provide a direct picture of the structure, but detects the existence of defects and their locations. With a little experience, the operator will be able to interpret the character of the defect and thus the characteristics of the seam itself. After the locations of the defects in the welded seam have been established, random

tests can be made with the first two methods in order to ascertain whether the prevailing fault is of a serious and dangerous character and whether it reduces the strength of the constructional part. The comparative simplicity and cost of the magnetic testing of welded seams will, however, make it possible to apply this test as a routine operation and thus induce the welders to exercise the greatest care in their work.

Apart from discovering welding defects, the magnetic tester described here is also capable of detecting other faults in metal products. Thus it can be used to detect possible faults due to rolling operations, slag content, alterations in structure due to tempering, corrosion and so on. It can also be used to detect cracks in metal products where the design is such that the faults could be ascertained by no other method.

APOLOGIES

In the fourth section of Walter L. Tann's article "Hydraulic Power and Its Application to Modern Industry", which was published in the June issue of this magazine, Figures 2 and 23, which were illustrations of a radial piston pump, should have been credited to the Northern Pump Company, and Figures 24, 25, 26, 27 and 28, which were views of the hydraulic equipment employed in the operation of the stage elevators and orchestra elevator in Radio City Music Hall, should have been credited to Peter Clark, Inc.

Rivets. Price List No. 29 of the tubular and split rivets made by Chicago Rivet & Machine Co., 1830 S. 54th Ave. Cicero, Ill., is now being distributed by that firm. All of the various types and sizes of steel tubular and split rivets, rivet caps, brass split rivets, brass tubular rivets, and iron tubular rivets made by this firm are included, with prices. A table of charges for plating rivets is also included. Copy free upon request.

Mention MODERN MACHINE SHOP when writing to advertisers. Your cooperation will be appreciated both by the advertiser and this magazine.

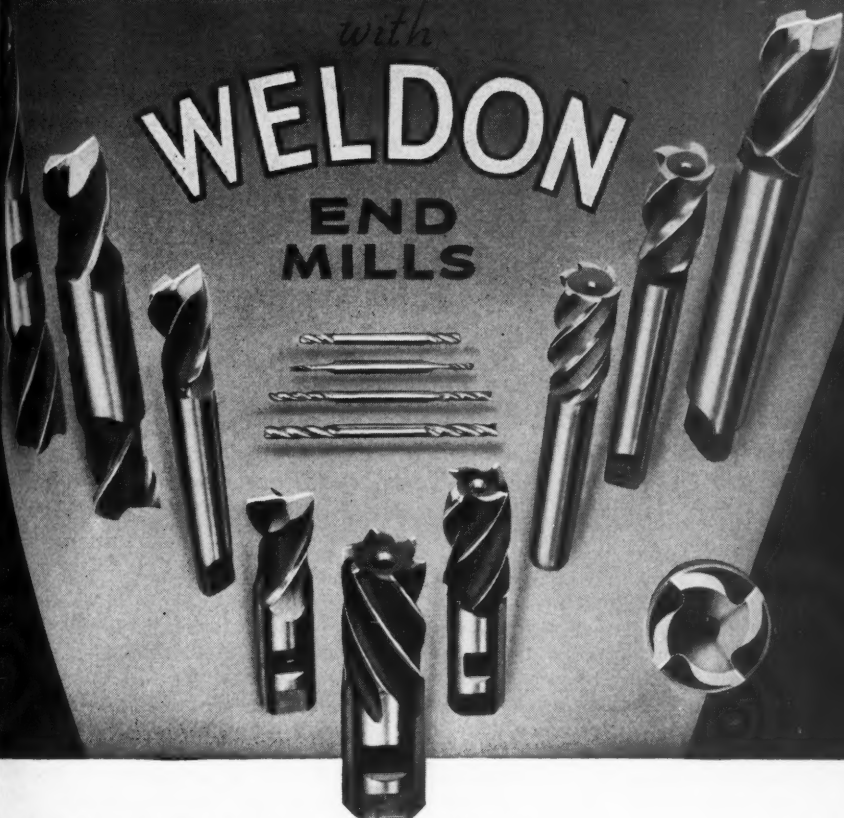
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LESS BREAKAGE

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WELDON
END MILLS



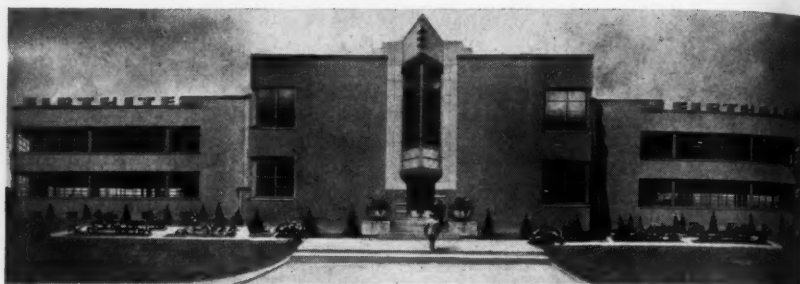
1. No nicks to weaken teeth on the end of the mill.
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"Pioneers in Fast Spiral Double-end End-Mills"



New Firth-Sterling Plant Model of Modern Factory Construction

Beauty and Efficiency are Combined Through the Use of Glass Bricks, Stainless Steel, Plate Glass and Aluminum

A MANUFACTURING plant in which all of the newest practical ideas in factory design are embodied—as modern as the sintered carbides which will be produced within its walls—has been completed and opened by the Firth-Sterling Steel Company at McKeesport, Pa. Surrounded by a garden, the structure is distinctly modernistic in design, and such decorative materials as glass brick, plate glass, stainless steel, Carrara glass and aluminum have been used in its construction. These materials were used in order to achieve the strict, ideal working conditions necessary for the production of sintered carbides. The entire factory has been designed to achieve the utmost in light, cleanliness, temperature and dust control.

The building is two stories high, the main section being 220 feet long and 70 feet wide. An office wing, extending from the center, contains a lobby and display room. Here plate

glass windows provide ideal working light, glass brick is used for stairwells and interior partitions, and the offices are soundproofed by using separated double glass partitions. Some of the rooms have terrazzo floors, Carrara glass walls, and linoleum ceilings; thus every surface may be washed to eliminate the possibility of the intrusion of foreign matter which would cause defects in the finished tools.

A dust filtering ventilation system has been provided as a further precaution, and provision has been made for the future installation of an air conditioning system.

The new building has been designed to permit efficient and orderly production, the elimination of wasteful handling of materials, and time losses. The manufacturing departments have been equipped with the most modern machinery and equipment, essential to the intricate processes of manufacture of the product.



Fig. 1510 "Unshako"
Self Locking Nut.
Cut out section shows the
Locking Ring in position.

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SELF-LOCKING NUT with a **GRIP** that Really Holds

Once in, no amount of jarring or vibration can loosen the UNSHAKO Self-Locking Nut. (Yet, it backs off easily with the aid of an ordinary wrench.)

The built-in, self-locking ring or floating thread holds it fast (without fuss with straying pins

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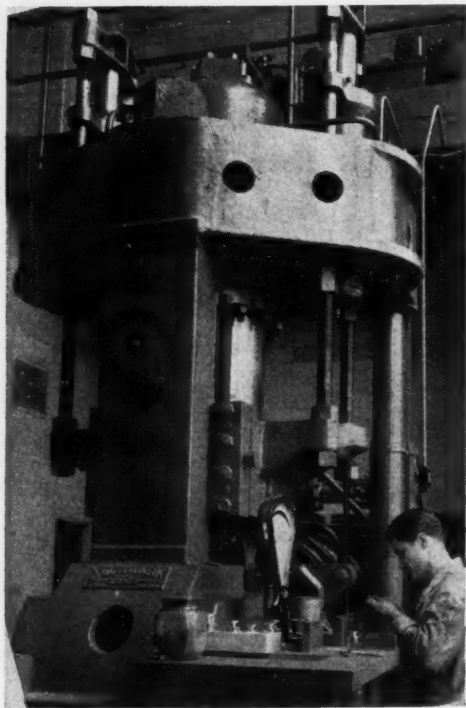
Send me—without obligation—ALL the facts about "Unshako".

Mr. Title.....

Firm

Address

Upon entering the building, one passes through a hallway formed by glass brick partitions, directly into the lobby. Here are display cases containing a variety of finished tools and dies as well as specimens of Ferberite ore (Iron tungstate). This ore is



A view of the 400 ton two-way press where powders are compacted into the shape approximately 20 per cent larger than the finished blanks or nibs. Pressures range from 4,000 to 60,000 pounds per square inch of surface.

mined on the company's properties in Colorado, by the Wolf Tongue Mining Company, a wholly owned subsidiary. The tungsten is put through a chemical process of refinement in the company's laboratory at McKeesport.

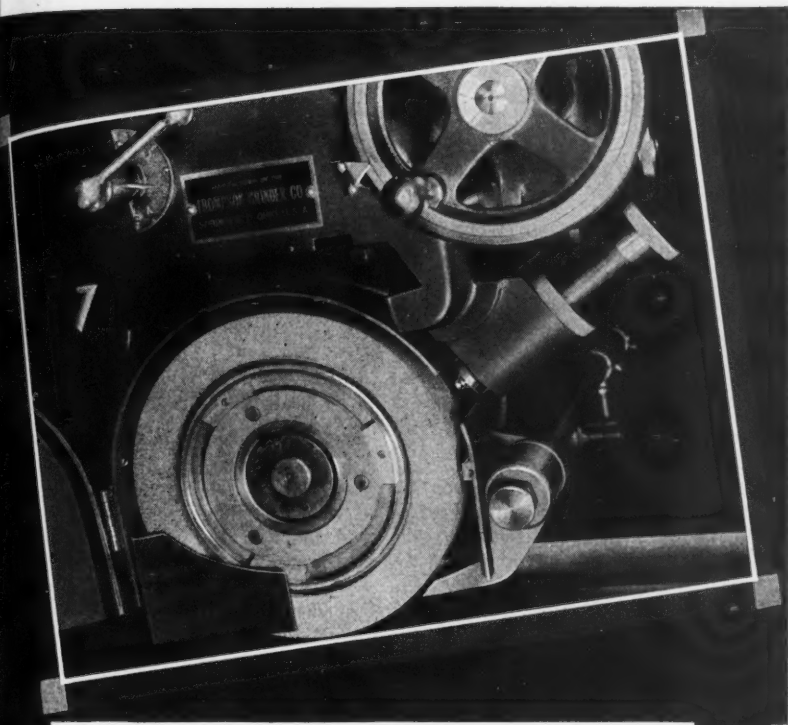
The first step in the manufacturing process is the carburizing of the pow-

ders after which they are transferred to the mixing room. In this room provision has been made for the maintenance of absolute cleanliness, essential to the manufacture of the product. The walls are of Carrara glass; the ceiling and floors of waterproof material; the bench tops of steel; and the equipment throughout is of material that can be washed and cleaned readily in order to eliminate the danger of the powder being contaminated. Carburizing is accomplished by heating a mixture of carbon powder and metallic tungsten powder to a high temperature in a non-oxidizing atmosphere. The resultant carbides are crushed by ball milling and returned to the mixing room where they are combined with tantalum carbide, titanium carbide and cobalt powders. These are then mixed in various proportions to produce the different grades.

In a stainless steel filtering sink located in the center of the room, distilled water is added to the charge or mix. Later the milled charge is brought back and the greater part of the water filtered off. After filtering the powder is dried in thermostatically controlled baking ovens, mixed with cobalt powders, and delivered for a final ball milling.

The ball milling room is quite different from the mixing room. Here the process is entirely mechanical. The containers are put upon machines of special design in which the charges are rolled or tumbled continuously for days.

Another purpose of milling is to coat the hard particles of carbide with a metal binder such as cobalt. To do this the milling or rolling must con-



GET OUT YOUR PENCIL

While there are several notable features on the Thompson grinder, one in particular stands out . . . the way the wheel is trued.

Every time the wheel moves to its rear position it passes the sizing diamond and is automatically redressed. Not even a fraction of a second is lost.

Compare the Thompson **time saving** wheel-truing method with the way wheels are redressed on other grinders. Get out your pencil and estimate the superiority of the Thompson way over ways that slow the work and retard production.

THE THOMPSON GRINDER COMPANY
SPRINGFIELD, OHIO

THOMPSON



A general view of a shaping room in which materials in their pre-sintered condition are being shaped. In this department, all machines are equipped with exhaust fans.

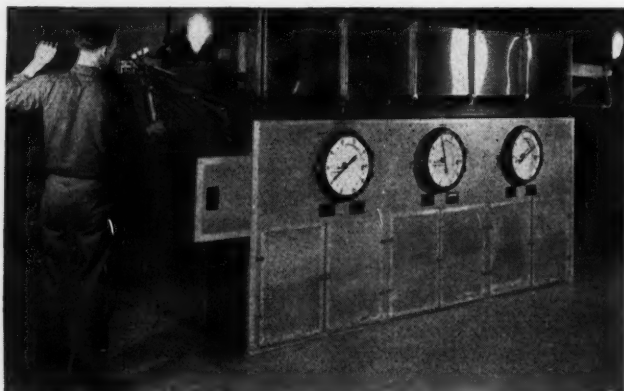
continue until every particle is coated to an extent that will give the desired binder content in the finished product. When the milling is complete, the charge goes back to the mixing room where all trace of water is removed.

In the manufacture of Firthite and Firthaloy, these ball mill batches are comparable to the "heats" of a steel mill and the identity of each is preserved throughout the process so that the mill number upon a finished tool or die permits tracing of the material back through every step to the mixing of the powders.

The powder mixture then goes to

a two-story room containing a 400-ton two-way press for large production pieces, and a small press for compacting smaller units such as individual blanks or nibs. Here the proper quantity of powder mixture is weighed in accordance with the piece to be pressed and the mixture is then spread uniformly in a mold or die.

So as to allow for a surprising shrinkage in all dimensions in the final sintering, all molds are made larger sizes and shapes to produce pieces approximately twenty percent larger than the finished product. The molds are of a type which can be completely disassembled without affecting



Charging pressed pellets into a low temperature sintering furnace which is automatically controlled for temperature and of hydrogen stoking speed.



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FOR THE CONTROL OF SINGLE AND DOUBLE ACTING CYLINDERS

Poppet Type—Simple in design, lightning swift in operation. The speediest valve obtainable. Hand, foot, mechanical and solenoid controlled types.

All ports on one face. Piping permanently attached to compact bracket mounting, making installation simple and servicing easy.



Simple
Mounting Bracket

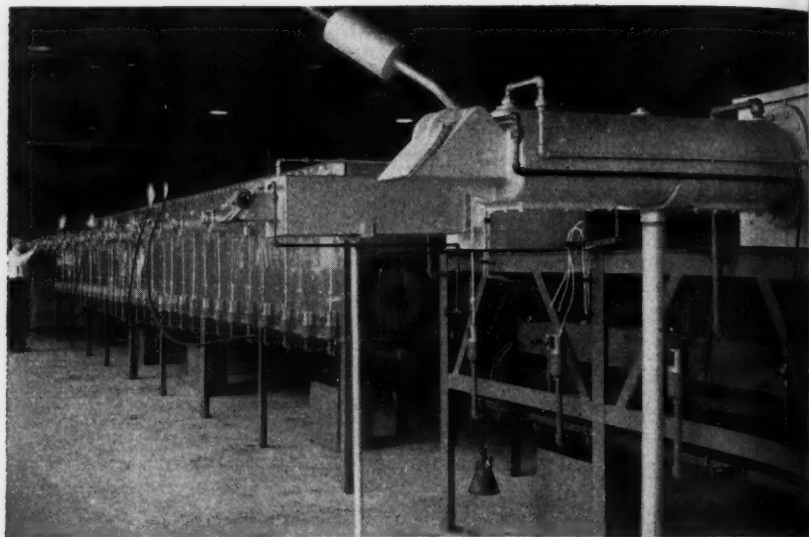


Economical
Resilient Gasket

ROSS OPERATING VALVE COMPANY

6488 Epworth Blvd.

Detroit, Michigan



One of a battery of high temperature hydrogen atmosphere sintering furnaces.

in any way the compacted blank which is very fragile in spite of the great pressure to which it has been subjected. Pressures range from 4,000 to 60,000 pounds to the square inch of surface depending upon the type of material and the size and shape of the blank.

The next step is to give the compacted piece a preliminary heat treatment. It is put through a "presintering" furnace having three electrically heated sections in which a hydrogen atmosphere is maintained throughout. Temperatures are indicated on large dial pyrometers. The fragile blocks are placed upon graphite slabs and heated to a temperature at which the metal particles coalesce and make a somewhat less fragile piece with a chalk-like hardness. The piece when cooled, is then ready for shaping.

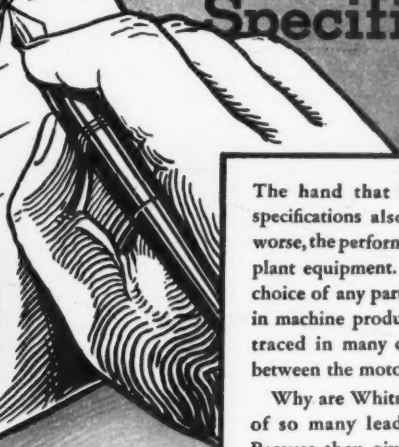
In the shaping room, glass walls have been installed as well as easily cleaned floors and ceiling. In this department the atmospheric problem is the opposite of that in the mixing

room. Here the problem is to keep the air clean for the benefit of the workers. Every mechanical shaping device is equipped with exhaust fans to remove all particles of fine dust produced by cutting the rectangular and cylindrical blocks to the varied and intricate shapes and sizes used in tools and dies.

When the piece is shaped it is ready for sintering, the process of heating to the melting point of that metal in a compound which melts first, and thus becomes a binder for the other unmelted particles. Special furnaces have been designed and built for the sintering process in order to insure a hydrogen atmosphere. The heating chamber of these furnaces is an aluminum tube, wound with a resistance wire (molybdenum) which permits accurate control of temperature. A water cooled section adjoins the heating tube so that rate of cooling is also controllable. The shaped pieces are packed in carbon "boats" with carbon

Write *PERFORMANCE* into your drive Specifications

*Chain Drives
by Whitney*



The hand that writes your power drive specifications also writes, for better or for worse, the performance of your machinery and plant equipment. More is at stake than the choice of any particular drive, because losses in machine production and efficiency can be traced in many cases directly to the drive between the motor and the machine.

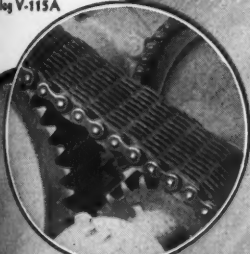
Why are Whitney Chain Drives the choice of so many leading machinery builders? Because they give maximum power to the machine with minimum frictional losses and because they do not depend upon excess belt tension and bearing loads to give efficient operation. In other words, they allow the full machine capacity to be realized.

Another interesting fact about Whitney Chain Drives is their economy. Due to the generous use of heat treated alloy steels and precision manufacturing methods, Whitney Chains stand up under the most severe operating conditions, and pay their cost many times over in freedom from breakdown and production losses.

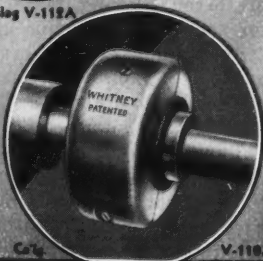
Write today for further information on the Whitney line which includes Roller Chain, Silent Chain, and Flexible Couplings. Our engineers are always ready to make recommendations. The Whitney Chain & Mfg. Co. Dept. B-2, Hartford, Connecticut.



Catalog V-115A



Catalog V-118A



Cat.

V-118A

Write today for
Catalog on Whit-
ney Roller Chain,
Silent Chain or
Flexible Couplings

WHITNEY CHAIN DRIVES

powder for uniform heating. The boats are introduced in a preheating section of the tubular furnace and then mechanically stoked or pushed through the heating and cooling sections, always in a hydrogen atmosphere. After sintering, the pieces have attained their final hardness and are ready to be used in a tool or die.

Each six-pound batch is carefully controlled for hardness, specific gravity, resistance to cross breaking

finish Firthaloy Carbide Dies in the many shapes and types required by the ever increasing use of drawing as a means of shaping metal.

The Brazing department is one of the most important in the plant because the carbide blank or nib is usually mounted in a holder or casing and the accepted method of securing is by brazing. Specially designed, electrically heated, hydrogen atmosphere furnaces are used. These fur-



Brazing Department—Here Firthite tips, which form the cutting edge of tools, are attached to strong steel shanks. Pure copper is used as a solder, and brazing is accomplished in the furnaces shown in the photograph. Temperature is maintained at 2,050 degrees F.

stress, and microscopic structure.

The carbides are then sent to the tool or die shops. One end of the first floor is the Firthite Tool Shop, where finished tools of all kinds are made for users who are not yet equipped to make their own from the Firthite blanks. In the tool shop, the machinery does not differ from that of any up-to-date tool making plant, except in the grinding where diamond wheels are used in a number of the finer operations.

On the other half of the floor is the Firthaloy Die department where there are machines specially designed to

naces are also sold to customers who make their own tools. Copper is the preferred brazing material, although for some purposes tips are fixed with "silver solder". The brazing of tips on tools supplied to customers completes the line of forms in which the carbides are supplied.

Types supplied for cutting are called Firthite, while those supplied for drawing or forming are called Firthaloy. Wear resisting parts can be made of either Firthite or Firthaloy, and offer an undeveloped but extensive field for the use of sintered metal products.

Let Gairing Engineers help you.



No single factor in production is more important than the quality of service rendered by cutting tools. Gairing tools are used in plants where there is a constant lookout and reward for ability to do a superior or special job better than before and where efficiency and long life in a tool are fully appreciated.

Standard and special design cover a very broad range of machine applications. Consult our Engineering Department for details. Special tools to your blueprints, or specifically designed to meet your needs, are available.

Years of accumulated experience in the designing of standard and special cutting tools is at your disposal without obligation. Write for a catalog of the Gairing line on your company letterhead.

Gairing representatives are located in all the important industrial centers.

Manufacturers of STANDARD and SPECIAL CUTTING TOOLS and TOOL HOLDERS
 Counterbores and Countersinks . . . Counterbore Sets, Spotfacers . . . Core Drills, Reamers, Hollow Mills . . . Full Floating Holders, Facing Heads . . . Form Cutters, Boring Bars, Boring Heads . . . Adjustable Extension Holders . . . Multi-Diameter Cutters . . . Tungsten Carbide Tipped Tools.

THE GAIRING TOOL CO.

1629-35 WEST LAFAYETTE • DETROIT, MICHIGAN

In the 10 years that have passed since tungsten carbide tools were introduced in this country, they have brought about changes in machine tool design, improvement in shop processes and made possible the commercial use of new materials. Although the selling price of from \$200 to \$400 a pound seems extremely high, the net result of the growing use of this new material is to reduce the cost of many necessities and luxuries bought by individuals and equipment supplied or bought by industrial institutions.

Hand Propelled Cleveland Tramrail Carriers with Motor Operated Hoists. This six-page folder, printed in colors, describes and illustrates a wide variety of installations in which Cleveland Tramrail Hand Propelled Carriers with motor operated hoists are used. It also explains the design of the hoists and illustrates, by means of photographs, the various parts which enter into the

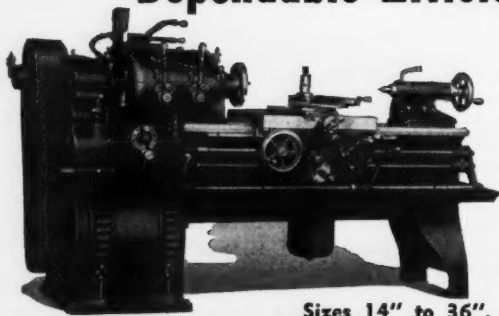
construction of the hoist.

Not the least interesting are the various types of hooks, baskets, and other types and designs of equipment for lifting and transporting workpieces, material in lump or powder form, foundry flasks, sheet metal, lumber, ladles, wire rope, dipping baskets, pipe, paper rolls and so on. Copy free by addressing Cleveland Crane & Engineering Co., Wickliffe, Ohio.

Thor Steel Letters and Figures. The complete line of steel letters and figures made by the Pittsburgh Stamp Company, Inc., 812 Canal St., Pittsburgh, Pa., is described and illustrated in a 20-page catalog now being distributed by this firm. In addition to presenting pictures and descriptions of the various types and sizes of steel marking stamps made by this firm, the text includes a discussion of the manner in which the letters and figures are cut, the steel used in these stamps, the hardening procedure, and the manner in which steel stamps should be handled to obtain the best results. A table of sizes and prices is also included. Copy free upon request.

BOYE & EMMES LATHES

Dependable-Efficient-Economical



Sizes 14" to 36".

THE BOYE & EMMES MACHINE TOOL CO.
CINCINNATI OHIO

Not empty claims, but actual records of performance in hundreds of railroad shops, maintenance shops and manufacturing plants furnish proof of the dependability, efficiency and economy of BOYE & EMMES LATHES.

Write for complete facts on the finest BOYE & EMMES LATHES ever built.



"The Lathe With The Longer Life"

YOU TEST THEM!



TRADE MARK

Socket Screws

Quality inside and out!

Ten-Tor Testing—an exclusive Holo-Krome feature—is more severe than any normal test you would make; nevertheless—You Test Them!

After you have made your test, you will agree Holo-Krome FIBRO FORGED Socket Screws are the Standard of Value.

FREE TEST OFFER

Write our Department H giving style, size, and quantity, and the screws required are yours for the writing.

THE HOLO-KROME SCREW CORP.
Hartford, Conn., U. S. A.

The Standard of Value

HOLO-KROME

Use Standard Rather Than Special Motors

By A. C. DANEKIND

(Read at General Electric "Speed Show" in Cincinnati May 24, 1937.)

THERE is no questioning the fact that much progress has been made by the machine-tool industry, for users are showing a rapidly accelerated desire to purchase equipment which will reduce both set-up time and the degree of skill necessary to operate the machine.

I note with considerable concern, however, the ever-increasing number of special motors which are appearing in recent machine designs. While it is a fact that the use of these motors is confined, for the most part, to fractional sizes which are used for auxiliary purposes, there are any number of glaring examples where a perfectly standard N.E.M.A. motor might have been applied if proper thought had been given the subject by the designer and the electrical application engineer when the machine was in the lay-out stage. Mechanical rather than electrical limitations in standard motors is apparently a designer's justification for selecting special motors for meeting specific requirements or conditions. All too often, however, co-operation with a capable electrical application engineer, when the machine was being laid out on paper for the first time, might well have overcome the necessity of resorting to the use of highly special electric equipment.

N. E. M. A. standards were established at the request of the Machine Tool Builders Association . . . and users of machine tools have every reason to prefer equipment operated

by standard electric motors and machine-tool designers have every reason to adhere to established standards insofar as possible.

Centralized control and motor-driven auxiliaries require adequate interlocking. I believe it advisable for a machine-tool designer to assume that if the control is arranged so that it can possibly cause a breakdown through mishandling of the controlling mechanism, it will probably be done and done shortly after the machine has been put in operation. This is the period when the machine will be under the closest observation by management and is, therefore, the time when the machine-tool designer's efforts are being appraised. It is unquestionably the job of the electrical application engineer to work in close co-operation with the machine designer in order that possibilities of breakdowns due to electrical limitations can be detected and eliminated. The cost of a few extra interlocking circuits is good insurance if they will definitely accomplish this result.

The primary objective of a machine-tool designer is to provide equipment which offers increased output capacity, ease of operation, simplicity of construction, and low-cost maintenance. The use of electricity rather than mechanical contrivances for driving and controlling a machine is definitely a more satisfactory means to that end. Electric equipment has grown to a point where it represents a very substantial portion of the to-

Complete Line Of

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SIMONDS

"RED END" HACK SAWS

for every metal cutting job

Now you can get Simonds "Red End" Hack Saw blades in three qualities for hand frames and power machines to cut every kind of metal straight and fast and at lower costs.

SIMONDS SAW AND STEEL CO.

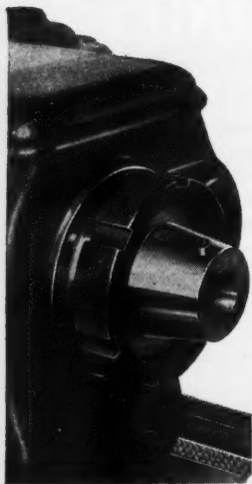
FITCHBURG, MASS., U. S. A.

tal cost of a machine, and present-day mechanical design problems require particularly judicious application of electric motors, controls, and accessories.

Conditions under which machine tools are operated are usually severe. In view of these conditions—all of which are outside the control of a designer of machinery—it seems quite obvious that the success of any electrically operated machine depends in a large measure on the fullest co-operation between the machine designer and the electrical application engineer while the design is in the lay-out stage. Unless this is done, operating limitations may well develop to place the machine-tool builder's reputation in a particularly vulnerable position.

Machine tools are nothing but contrivances by which energy may be

either transferred or transformed. In themselves, they are just combinations of mechanisms; hence in use and from an operating viewpoint, they are exposed to all the wiles of human attention. A machine-tool designer must expect his product to be subjected to severe operating conditions. He must go to extreme detail in giving consideration to every mechanical, hydraulic, or pneumatic principle at his command in an effort to obtain the ultimate in his machine. An electrical application engineer, by the same token, has a very definite obligation in properly applying electric motors, controls, and accessories to the designer's mechanism. Only by full and wholehearted co-operation between the two can machine tools be produced which will meet complete management's present-day conception of what constitutes adequate efficient equipment.



SIDNEY TAPERED SPINDLE NOSE

SIDNEY has now adapted the standard tapered spindle nose as optional equipment on the Tritrol 16-speed, Sidney 12-speed and SIDNEY Precision Tool Room Lathes.

Advantages: More power—greater ease in removing face plates and chucks—brings face plate and chuck closer to the front spindle bearing.

Write for further information.

"Lathes and Milling Machines"

THE SIDNEY MACHINE TOOL CO.
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6-INCH JUNIOR BENCH GRINDER \$19.95

A full quality ball-bearing unit, priced so you can spot several in your shop; for intermittent tool sharpening, light grinding, wire brushing; $\frac{1}{4}$ H. P. constant speed motor; ball bearings; light, strong alloy housings; adjustable tool rests; wide grinding wheels; rubber covered cable with plug and ground wire.

**Modernize your
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— TO CUT PRODUCTION AND
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WIDE-TYPE, HEAVY-DUTY, BALL-BEARING GRINDERS with extended spindles and tapered housings, simplify handling large and awkward pieces. Completely enclosed wheel guards comply with safety regulations; tool rests and spark shields adjustable for wheel wear. Grease-sealed ball bearings minimize vibration. Three powerful models for heavy-duty work: 6-Inch ($\frac{1}{4}$ H.P.); 8-Inch ($\frac{1}{2}$ H.P.); 10-Inch 1 H.P.).



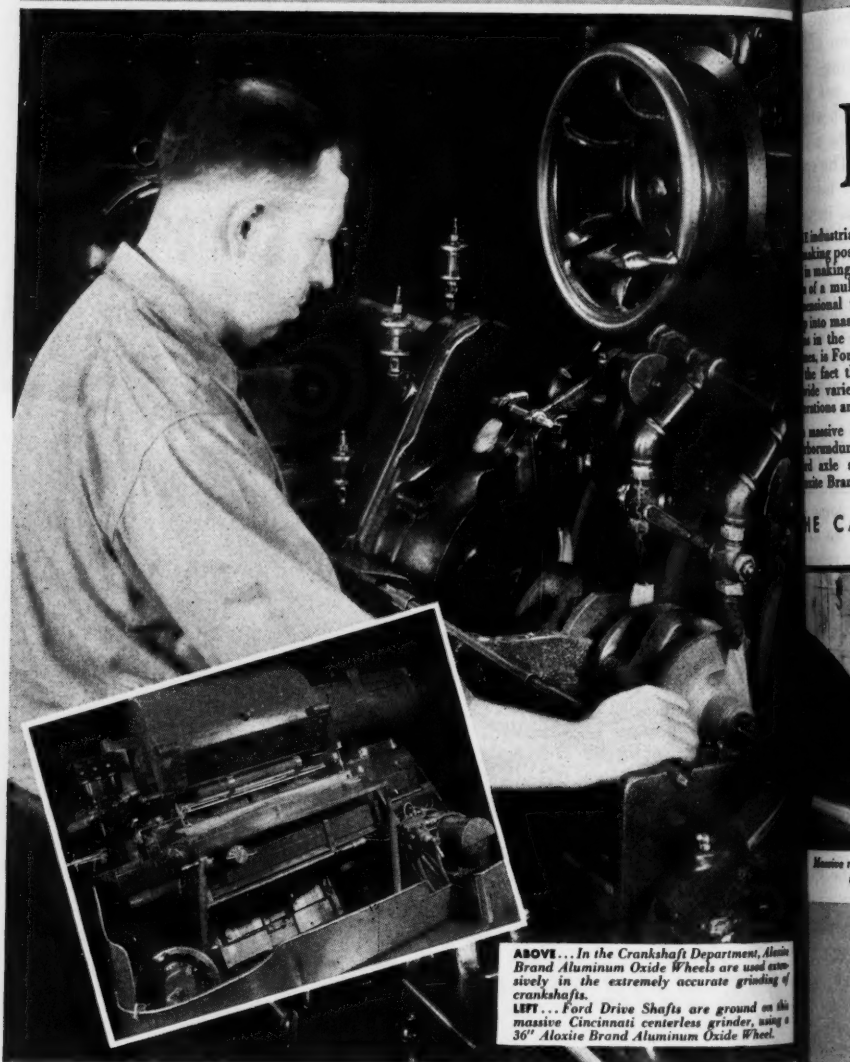
YOU'LL find exactly the Bench Grinder you need for every type of shop work in the new Black & Decker Bench Grinder Line. Check over your grinding operations. See how many ways Black & Decker Grinders can speed production and maintenance work. Then ask your Jobber for a demonstration, or write for catalog. The Black & Decker Mfg. Co., 720 Pennsylvania Avenue, Towson, Maryland.

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GREAT NAMES SERVED BY

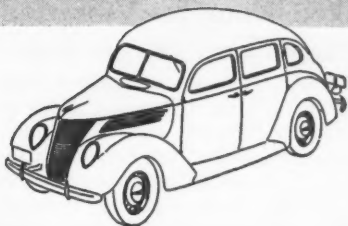


ABOVE... In the Crankshaft Department, Aloxis Brand Aluminum Oxide Wheels are used extensively in the extremely accurate grinding of crankshafts.

LEFT... Ford Drive Shafts are ground on this massive Cincinnati centerless grinder, using a 36" Aloxis Brand Aluminum Oxide Wheel.

EVERY CARBORUNDUM...

FORD



The industrial art of grinding has been a potent factor in making possible the mass production of automobiles. It has made possible the fast and economical production of a multitude of interchangeable parts to close tolerances. Grinding has put craftsmanship into mass production. One of the greatest institutions in the automotive industry, one of the greatest in the world, is Ford. The Carborundum Company is proud of the fact that it serves Ford in so many ways, on a wide variety of grinding, finishing and polishing operations and in the sanding of car bodies.

Massive Cincinnati centerless grinders, wheels by Carborundum are found grinding the four diameters of crank axle shafts. In the Crankshaft Department, Carborundum Brand Aluminum Oxide wheels are grinding

thousands of the extremely accurate Ford crankshafts.

Wheels by Carborundum equip many of the machines used for centerless grinding of pistons and are employed in grinding to extremely accurate size and high finish many of the massive rolls used in the rolling of steels.

Then, too, the perfect finish and high accuracy of Ford cylinders are produced by honing. Many of the multiple spindle machines are equipped with Carborundum Brand-Hutto heads fitted with Carborundum Brand Silicon Carbide sticks.

All of these accurate grinding operations reflect the high standards of Ford production methods, the Ford ideals of quality workmanship always back of their great production of a great car.

THE CARBORUNDUM COMPANY • NIAGARA FALLS, N. Y.

(Carborundum and Alonite are registered trade-marks of The Carborundum Company)



Massive rolls used in the rolling of sheet steels are ground to extremely accurate size and high finish.

Wheels by Carborundum equip many of the machines used for the centerless grinding of pistons.

CARBORUNDUM

REG. U.S. BRAND PAT. OFF.

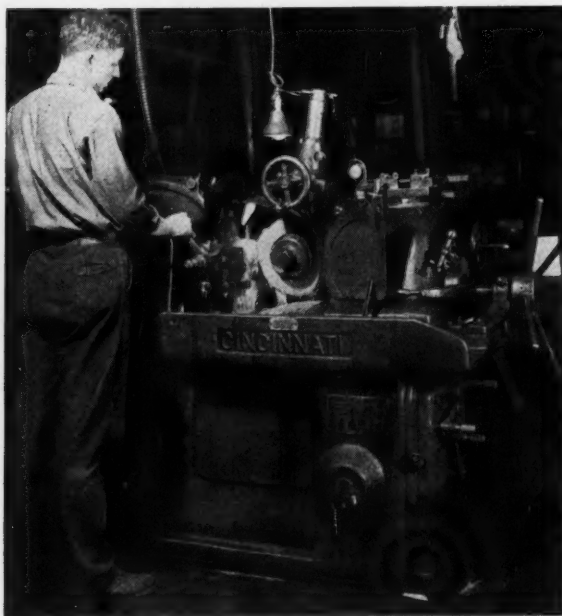
ABRASIVE PRODUCTS



Modern Equipment at Work

Timken Combats Vibration With Rubber Mountings

THUMP, thump, thump—with every thump a bearing cage is blanked and drawn out of $\frac{3}{8}$ -inch strip steel by one of the several large punch presses operating in the Canton plant of the Timken Roller Bearing Company. Although these press units are mounted on individual cement foundations extending down several feet into the ground, the vibration resulting from their operation is quite noticeable in surrounding parts of the plant.



Rubber mountings make it possible to operate this machine in close proximity to several heavy stamping presses without disturbing the setting of the indicators.

Despite this condition, Timken successfully operating a battery bearing grinders in a section of the plant immediately adjoining the pressroom. These machines are used for the precision grinding of bearings and work on them is held to a tolerance of ten thousandths of an inch. The operator is able to maintain this low tolerance limit by means of an indicating gauge on the machine. If subjected to the slightest amount of vibration, the gauge reading would be thrown off by several thousandths of an inch and would necessitate the frequent removal of the bearing from the machine for measuring purposes.

To eliminate any possibility of such disturbance, Timken engineers have mounted some of these grinders on double shear type rubber to-metal mountings known as Vibro-insulators. These mountings, which were developed by The B. F. Goodrich Company, are attached by simply bolting to the base of the machine. One of the grinders is shown in the photo. Thorough tests show that gauge readings are in no way affected by the surrounding vibration.

Another unique application of Vibro-insulators in the Timken plant is their use as motor mounting on

LESS

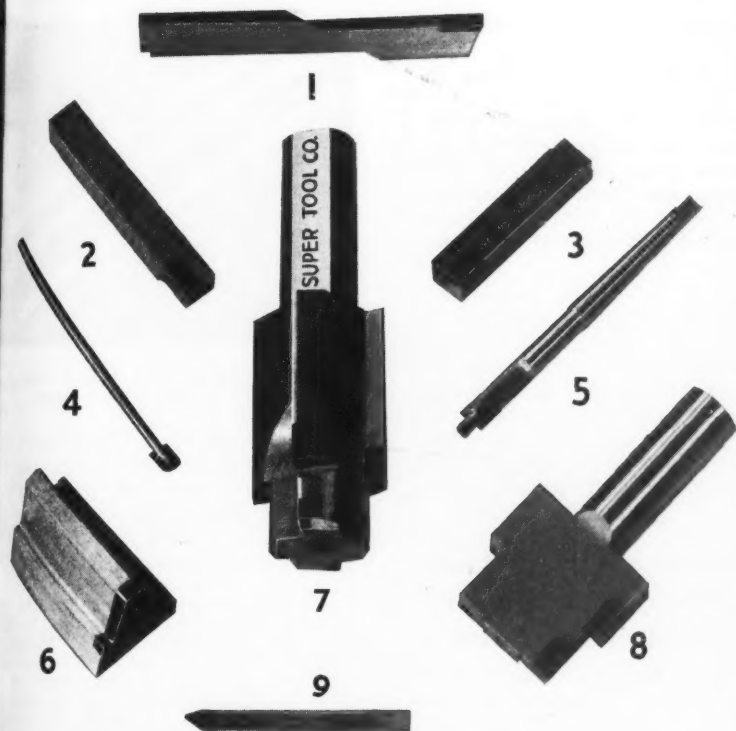
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LESS BREAKAGE MORE PRODUCTION GREATER ECONOMY with TECO TUNGSTON CARBIDE TIPPED TOOLS

less breakage . . . more production . . .
greater economy . . . are these things
important to you?
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ASK FOR TECO
TECO Tools have earned a reputation
"Tools that can take it".
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1. Piston Grooving Tool.
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8. Flat Drill.
9. Glass Drill.

SUPER TOOL COMPANY

56 EAST CONGRESS ST. • DETROIT, MICHIGAN

large vertical grinder which is used for grinding large bearing cups and cones. Power for the grinding operation is supplied by a 10 h.p. motor mounted on the spindle housing. To forestall the possible transmission of vibration from motor to the spindle, grooves were machined in the spindle housing and the motor was mounted on Vibro-Insulators without change of position.

Besides these two successful installations, Timken engineers have found many other uses for these rubber mountings. In addition to placing under motors and machines, they have also used them with success as mountings for several pieces of delicately adjusted laboratory equipment which are highly susceptible to vibration.

Diamond Bores Hole Through 12 Miles of Aluminum Alloy

THE tremendous amount of work, from the standpoint of wearing quality, of which the industrial diamond is capable is indicated by the production record of a Koebel Diamond Tool used on an Ex-Cell-O boring machine in a Detroit automobile plant. The operation was taking a finishing-cut on the wrist-pin holes of aluminum alloy pistons. The point of this diamond weighing less than one-half carat bored more than 200,000 pistons before it had to be reshaped. The total length of "hole" represented by these pistons if placed side by side would be approximately twelve miles. The total length of chip removed was more than 9000 miles, or approximately three times the distance across the United States! In this operation dimensions were held to an accuracy of .00015 inch.

This record is the more impressive because of the abrasive character of



This diamond bored more than 200,000 pistons before it had to be reshaped.

the piston metal, and of course, even after this period of service the diamond was in no sense "worn out". It required only re-lapping to the correct radius to prepare it for a similar period of production life.

Westcott Chuck Catalog No. 537. The catalog, now being distributed by Westcott Chuck Company, 700 E. Walnut St., Oneida, N. Y., contains descriptions of the line of lathe chucks made by the firm in a complete range of sizes and types for direct mounting on standard flanged spindle noses and on standard tapered key drive spindle noses. The book contains 42 pages, 8½ x 11 in. size, describing the Westcott I.X.L. Independent Lathe Chucks, Westcott Bevel Geared Scroll Universal Self-Centering Lathe Chucks, Westcott Spur Gear Scroll Combination Lathe Chucks, Westcott Light Duty Lathe Chucks in independent and universal types, and Westcott "Little Giant" Two-Jaw Dr. Chucks. Complete descriptions and illustrations of each type of chuck are included, together with tables of specifications and current chuck prices.

Copy free upon request.

Lewis-Shepard Skid Platforms. The many types of Skid Platforms that may be used in conveying materials, goods, merchandise, parts and products by the Lift Truck method of interior transportation will be found fully illustrated in a new colored folder, No. 146, just issued by Lewis-Shepard Co., 175 Walnut St., Watertown, Mass. Copy free upon request.

"HE'S DOWN IN THE PLANT TODAY"

More Than Ever Before Top Executives Are Back Scrutinizing Every Plant Operation

Finding Out:

- 1 WHY power costs so much.
- 2 HOW to cut down their annual maintenance costs.
- 3 WHERE to speed up daily production schedules.
- 4 WHAT will lower oil costs.

FOR 71 YEARS the makers of Gargoyle Lubricants have been helping the men who own plants . . . the men who run them. This experience—the greatest in the oil business—can be put to work in your plant . . . increasing manufacturing profits.

Take a Socony-Vacuum Engineer into your confidence. Let him discuss a program of planned "Correct Lubrication" with your capable plant men. Together, they may be able to devise ways and means of gaining more efficient production.



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**SAVES
MONEY
FOR
INDUSTRY**

Read what 71 Years' Lubricating Experience...the Greatest in the Oil Business...can do for You. See Next Page.

1 Careful selection of the right kind of lubricants for all types of power and production equipment... curbing losses and waste of power generated or purchased.

2 Proper methods of application... the right oil in the right amount... aiding higher machine speeds... less spoilage or rejects... protecting investments in machinery.

**THE SUM OF
THESE FOUR SAVINGS**

4

1. REDUCED POWER CONSUMPTION
2. MORE CONTINUOUS PRODUCTION
3. DECREASED MAINTENANCE
4. LOWER LUBRICATION COSTS

**= CORRECT
LUBRICATION**

3 Experience in dealing with individual operating conditions... correction of out-dated practices often resulting in excessive repair and replacement costs.

4 A planned lubrication program... quality lubricants where necessary... other lubricants where use will provide economy and not handicap machine efficiency.

SOCONY-VACUUM OIL Co.
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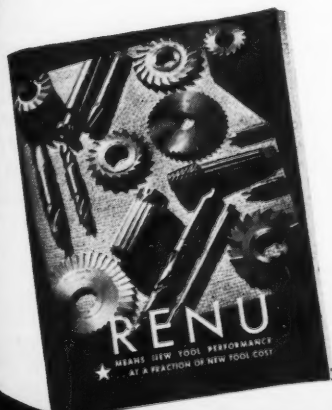


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Renu-ED CUTTER?

IT'S A BETTER LOOKING
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NEW ONES



When you send worn out tools to RENU to be reclaimed, you can rest assured you will get tools back that will not only look right—but will perform right under every working condition.



● A new catalog, outlining this money saving service in detail, is available for the asking. Write

Renu TOOL CO., 275 E. Milwaukee Ave., DETROIT

Ideas from Readers

This department is a clearing house for ideas . . . If there is a "kink" or short cut in use in your shop, send in a description of it . . . Each one published will be paid for.

Metal Case for Drawing Paper and Tracing Cloth

By J. J. THOMPSON

THE drawing presents the design of a case that was made primarily to keep tracing cloth and paper clean. Properly constructed it will, no matter how dirty the office is, keep the contents clean. Any draftsman who has worked in a foundry, shipyard or machine shop appreciates the almost impossible task of keeping coal dust from sifting through drawers. Tracing cloth is expensive, and yet yards and yards of it are cut off and thrown away because it is not usable. The use of this case will prevent this waste.

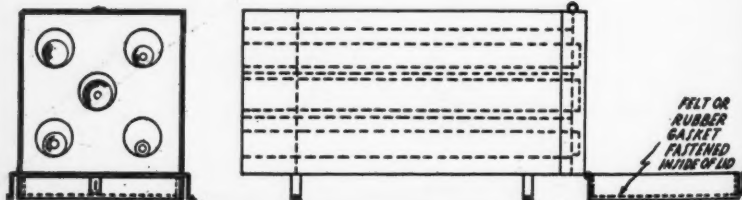
The case is cylindrical and is constructed similar to the flues in a locomotive boiler. Tubes of tin are formed and soldered to sheets of tin, which sheets in turn, are soldered inside of a rectangular box of wood or metal. The box has a hinge cover

at the end, inside of which is a gasket of felt or rubber. When the cover is hinged, the box is sealed. Aside from this important feature, the box offers an opportunity for having all such materials close at hand. It can be fastened in horizontal or vertical position to any available space on or near drawing board. This box is 14 in. square and 42 in. long, and the tubes are 4 in. in diameter. This size was adopted as best suited for standard drawing supplies.

Wire-Tension Device

By CHAS. H. WILLEY

WHEN winding coil springs in the lathe from small size wire, it is usual to guide the wire and at the same time apply the correct amount of tension by allowing the wire to pass between two pieces of leather—usually old leather belting—held in the hand. However, there are times when more pressure, or means for applying it more evenly, is necessary. In such cases the device shown in the



Metal Case for Drawing Paper and Tracing Cloth



Low Priced Dry Cutting HACK SAWS

In automatic production saws, band saws, high speed cutting off equipment and giant hydraulics, MARVEL leadership is proverbial. In the less spectacular equipment, the small low-priced, dry-cutting hack saws too, MARVEL dominates the field—80% in use are MARVELS.

These economical general purpose saws No. 1 and No. 2 are sturdier, with heavy rigid saw frames, hold blades at greater tension—assure straight cutting. All controls are set in front for convenience and safety, and frame slides in "V" bearings that have screw take-up to compensate for wear. They are in every way "more saw for the money." Equipped with unbreakable Hack Saws can be counted on to keep producing hour after hour, day after day.

**ARMSTRONG-
BLUM MFG. CO.**

"The Hack Saw People"
5845 Bloomingdale Ave.
CHICAGO, U. S. A.

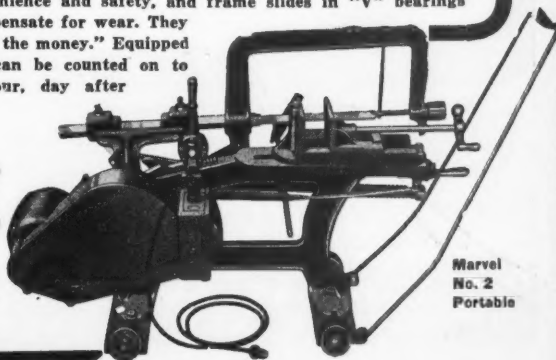


illustration is worth all it costs to make.

The device consists primarily of

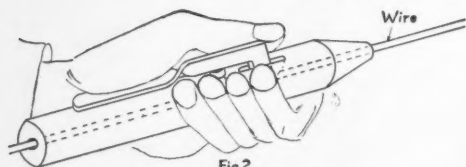


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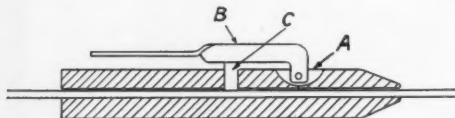


Fig 1

Drawing of Wire-Tension Device for Making Coil Springs in the Lathe

a piece of $\frac{3}{4}$ -in. round stock through which a $\frac{1}{8}$ -in. hole has been drilled lengthwise. A slot is milled as indicated at A, in which the end of the lever B is pinned by drilling a hole

crosswise. At C a $\frac{5}{16}$ -in. hole is drilled to receive a soft brass plug that is made to a sliding fit in the hole. The lever B can be made from sheet steel $\frac{1}{16}$ or $\frac{3}{32}$ in. thick, shaped as required. The $\frac{5}{16}$ -in. hole for the brass plug must, of course, be in line with the slot in which the lever is pinned.

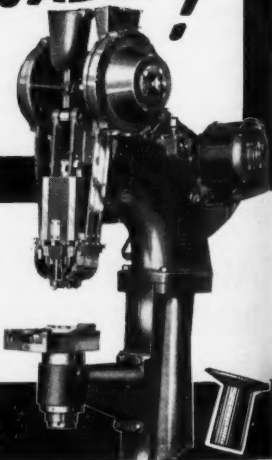
With this device a considerable amount of pressure can be exerted with practically no effort, and the pressure can easily be regulated as required.

Combination Depth Gage and Scale Clip

BY JOHN A. HONEGGER

THE drawing illustrates a handy "kink" that I have used many times, consisting of a scale clip that can also be used as a depth gage. The

4 RIVETS SET AT ONE TIME AUTOMATICALLY!



● Originally developed for a large car manufacturer, the same application is now available to general industry. It sorts, feeds, inserts and sets 4 rivets with a single pedal operation. STILL LOWER ASSEMBLY COSTS ARE NOW PRACTICAL. Tell us your problems and send sample assembly with inquiry, if possible.

Single, Double, Triple and Quadruple Rivet Setters for Tubular and Split Rivets

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TUBULAR AND SPLIT RIVETS—ALL METALS

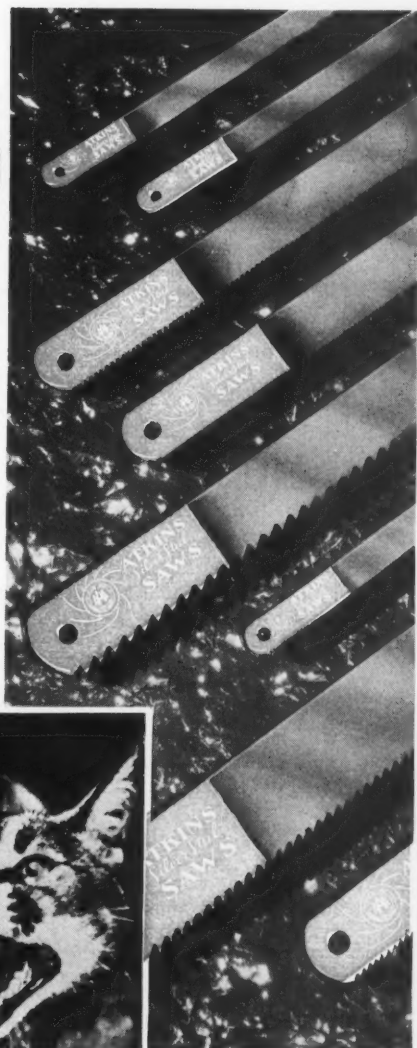
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SAW TEETH BITE

Hacksaw economy is not a matter of price . . . durability, quality and actual efficiency must be considered. In Atkins Silver Steel Saws you get them all.

- Extra hours of accurate cutting.
- Uniform temper.
- and "Teeth that Bite" . . . quick . . . smooth and clean.

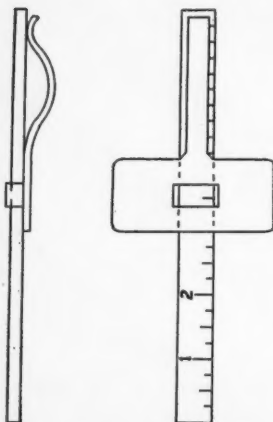
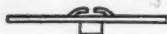
80 years of laboratory analysis . . . tests and improvements have established Atkins Silver Steel Saws as leaders in every field. See your distributor and make your own tests.



E. C. ATKINS AND COMPANY • INDIANAPOLIS, INDIANA

ATKINS SILVER STEEL SAWS

clip is made from a short length of spring steel, shaped in the form of a letter T. The vertical section of the T is bent to form a clip for holding the scale in the pocket. A rectangle in the cross section is marked off and three sides are cut loose so that a



Combination Depth Gage and Scale Clip

tongue will be formed which can be bent to hold the scale, the tongue being adjusted to obtain just the right amount of tension.

Using the side of the T opposite the pocket-clip, the device enables the use of the scale as a depth gage for measuring depths of holes, for meas-

uring lengths of stock, for scribing lines at specified dimensions, and so on; in fact, the number of uses that can be found for such a tool are practically unlimited.

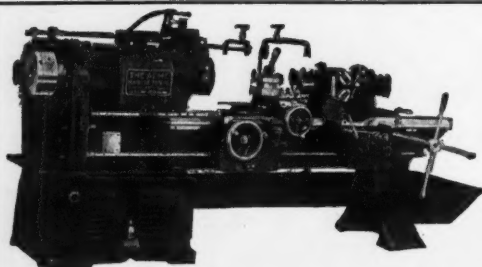
Emergency Tools for Checking Piston Rings

BY ELTON STERRETT

EVEN in these days of telegraph and aeroplane deliveries the local machine shop sometimes gets a rush order for some specialty usually secured direct from its manufacturer.

One such unusual demand called for a set of 10.125 x 9/16-in. piston rings—a non-stock size for the manufacturer—the specifications including such requirements as “diametral tension to be 65 pounds, plus or minus 5 pounds” and “plus circularity to be not less than $\frac{1}{4}$ in. nor more than $\frac{3}{8}$ in. at proper gap closure.”

Raw material for making these rings was readily obtained from the foundry, blanks being cast separately for better metal quality control than would have been possible if the ring blanks of the cylinder or “pot” type had been used. As there was no means available for hammering the rings to set up the desired tension within the metal, tension was obtained by first turning the ring to a diameter greater than that desired, and then, after removing a section to provide the gap,



Cincinnati Acme Universal Turret Lathes

A powerful rigid machine for a wide range of accurate bar and chuck work.

Write for Circular

THE ACME MACHINE TOOL COMPANY
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NEW-14 inch "DELTA" Metal-Cutting Band Saw

The regular 14-inch Delta band saw, fitted with counter-shaft to reduce the speed, has been used in hundreds of shops for cutting Iron, Steel, Brass, Bronze and Aluminum bars, shapes and sheets; in foundries for cutting off gates, in die-casting shops for trimming and sawing castings.

Here is a new and improved back-geared model which is even more ideal for this work. It is the perfect machine for the general machine shop, toolroom or experimental shop, where many different materials must be cut.

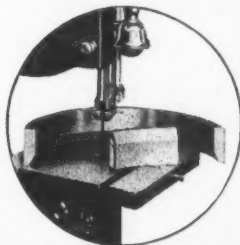
It takes the place of a power hacksaw in cutting off bars and shapes; it is used in the toolroom for sawing off tool, die and fixture stock; it will cut uniform strips from sheets; it saves hours of time in cutting templates and similar tools, and will cut almost any material, such as asbestos, mica, vulcanite, fiber, etc. . . . difficult to cut by ordinary means. Provision is made for four low metal-cutting speeds and one high speed for wood sawing.

Write for special circular giving full details and specifications.

\$79⁵⁰

14" Back-geared Metal-Cutting Band Saw, complete with guards, 8" arbor pulley for wood and cone pulley for metal. With one 14-tooth metal-cutting blade. Without light attachment, belts, stand, motor or motor pulley. Shipping weight 175 lbs.

The draw-die segment ring illustrated was impractical to cut on the milling machine because of the diameter of cutter required. It is cut with ease and speed on the Delta band saw. Try your next "awkward" job on one of these versatile tools.



DELTA MANUFACTURING CO.

614 EAST VIENNA AVE.

MILWAUKEE, WISCONSIN

closing the ring to the proper measure and turning it to fit.

Due to the size of the ring and the amount of tension desired, holding the ring was difficult, especially when calibration of the tension was attempted across the diameter. In order

compress the ring and close the gap to the specified measurement for the size of the ring. Finding this method tedious and unsatisfactory, and knowing that circumferential tension is approximately one-third that of diametral tension, use was made of this relation to enable a quick and certain check to be made.

A simple but effective squeezing device was made by clamping a breast drill to the edge of an improvised platform behind a block which prevented sidewise motion. The drill is shown in Fig. 1. Then, driving a nail in the platform at the opposite corner, and hooking the ring of an ordinary 50-pound capacity spring balance to it, a wire was attached to the hook, the wire being long enough to go around the periphery of the ring and leave slack enough to reach the compressor mandrel. This mandrel was improvised from a short section of $\frac{3}{8}$ -in. bolt held in a drill chuck, with the end of the wire bent over and inserted between two chuck jaws. By revolving the large gear of the drill, the mandrel was revolved and the wire wound on it, pulling the wire taut and compressing the ring sufficient to leave a gap of the required width. At this point the pointer on the scale of the spring balance showed the circumferential

tension in the ring to be 23 pounds, which, being one-third of 69, fell within the set limits.

The plus circularity of the rings was determined on the same rig as the tension, with the spring balance omitted. To ascertain this factor in a

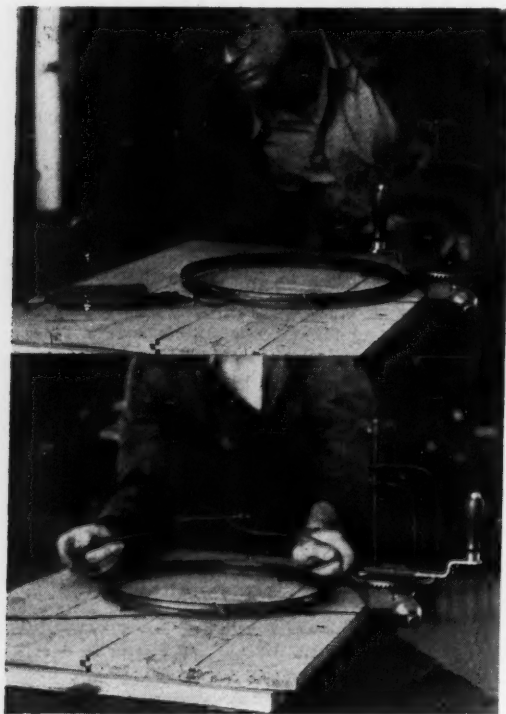


Fig. 1 (Above)—Using a breast drill to compress a large gas engine piston ring so that the tension could be gaged. Fig. 2 (Below)—To cut down the flutter of ring ends in service, the diameter of the ring, closed to provide a gap of the correct width, must be less than that through the properly closed gap. This "plus circularity" varies with the diameter and thickness of the ring.

to calibrate the ring, it was necessary to hold the ring upright on a platform scale, without distortion or restriction, with the gap one-quarter of the circumference from the point of contact of ring and scale, and to apply pressure on the highest point so as to

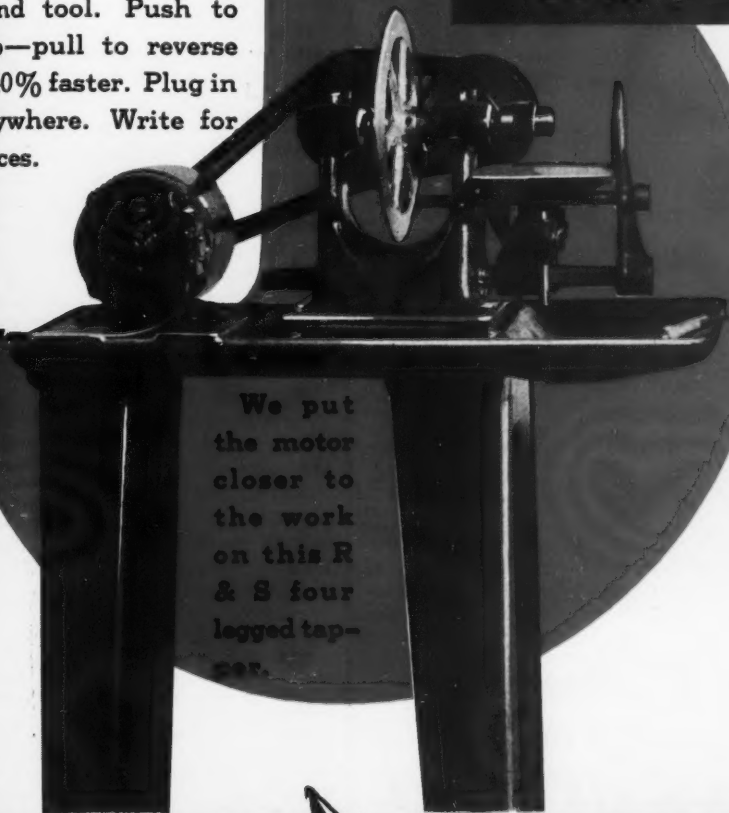
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Adjustable
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You asked for this improvement and here it is. The original friction drive tapper with the convenience of a power hand tool. Push to tap—pull to reverse it 40% faster. Plug in anywhere. Write for prices.



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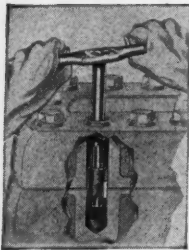


Adjustable Boring Heads; Collapsible Taps
Solid Adjustable Die Heads; Chasers;
Self Opening Die Heads; Solid Adjustable Taps

Tapping Machines; Automatic Cut-off Machines
Automatic, Single Purpose
Threading Machines

NEW METHOD

To Remove Broken Bolt Ends From Depths without dismantling or expensive delays.



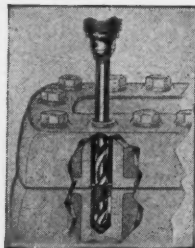
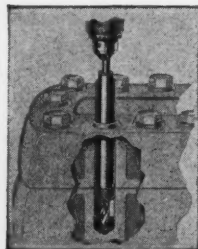
Three easy steps with **RIDGE "Lon-Grip"** and your broken threaded ends are OUT!

FIRST—Drill a small hole clear through the broken end using a snug fitting **RIDGE Drill Guide** for precision centering. This centering hole is for the larger drill to follow. **SECOND** — Remove Drill Guide. Drill out the small center hole to large diameter for receiving the husky **"LonGrip"** straight fluted extractor.

THIRD — Drive the **"LonGrip"** extractor into the thin hollow remaining shell and turn it out. No slipping, no reaming. Does not expand or distort sidewalls of shell.

Sets for all sizes of studs and screws and various depths.

Ask your jobber to show you these remarkable trouble-shooting tools.



75% of your wrench repairs are stopped when you use **RIDGE** with the unconditionally guaranteed housing.

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LONGGRIP

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EXTRACTORS

The Ridge Tool Co., Elyria, Ohio

ring it is necessary that it be compressed to proper gap spacing, at which point the diameter as measured through the gap must be greater than that taken at right angles thereto by the amount of excess specified.

For this work ordinary outside calipers were used, the compressor holding the ring firmly without in the least affecting its tendency to assume a form corresponding with the forces acting within itself. The only precaution found advisable in making this check was to see that the gap came as closely as possible to the spot where the tangential portions of wire crossed as they encircled the ring. To insure this and to prevent the ring from possibly binding slightly on the calibrating platform, it was supported on small rollers of 1/4-in. welding rod, each two inches in length, placed under the ring at points 90 deg. apart. This device enabled the ring to center itself without frictional restraint and thus removed any oblique strain from the wire either at the fixed end or the tightening mandrel.

By using the device described, the shop was able to deliver a set of rings which had the specified qualities, filled the emergency order quickly, and gave all the service which could be desired, with a saving of time amounting to three days over the shortest time in which the rings could be obtained from the manufacturer of the engine.

Brown & Sharpe Master Feeding Finger. This four-page folder, describing the B & S Master Feeding Finger with interchangeable pads, is now being distributed by Brown & Sharpe Mfg. Co., Providence, R. I. The folder describes the No. 22M Master Finger and photographs are included illustrating the manner in which the master finger and pads are used. Pads of hardened steel, bronze and cast iron are described and illustrated. Specifications are given for the different sizes of fingers, together with current prices. Copy free upon request.

A BEFORE & AFTER story

that Shows a Saving of 20% to 60%

BEFORE



● The 1" taper shank reamer at the left, costs new \$4.40. The 15/16" recut tool at the right, costs new \$4.00. Reclaiming by the N. T. S. method costs only \$2.00—a saving of \$2.00 (50%).

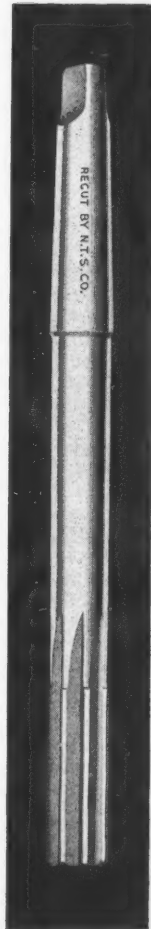
That's the end of our story but it's only the beginning of your savings. Why not send a trial order and find out for yourself how to save 20% to 60% on your tool costs? We will grind your tools to their original accuracy without destroying the temper and guarantee them to be as good as new.

We pay shipping charges one way.

Write for our 18 page illustrated catalog.

NATIONAL TOOL SALVAGE CO.
DETROIT MICHIGAN

AFTER



TOOL SALVAGE IS TOOL ECONOMY

Over the Editor's Desk

The Parable of the New Deal

A Certain Man had a Vineyard in which Labored many Servants, and the Servants Arose Early and Travelled Many Furlongs by Foot in Order that they might Arrive before the Blowing of the Whistle. And in Due Time one of the Servants became weary and Foot-Sore, and He Raised his Voice in Complaint, Saying: I shall Build a Chariot, and the Wheels shall Turn, and the Chariot shall Move Swiftly, and there shall be Neither Ox, nor Ass, nor Horse Before, but it shall carry Oil, and the Oil shall Burn, and the Burning thereof shall cause the Chariot to Move.

And the Servant Labored early and late, and Builded the Chariot, and the Chariot did go Whither he Listed, and the Speed was such that the Driver could Travel many Furlongs, and Complete many Tasks, while yet it was Day.

And the People Marvelled, and Many brought their Gold to the Servant, saying: Build me a Chariot likewise. And the Servant became a Master, and Builded a Shop, and gave Hire to a Neighbor to Help him. And he Considered the Laborer Worthy of his Hire, and he Paid him a Goodly Wage, and the Laborer was Happy, and in Time he also Bought a Chariot.

And the Servant who was now Become a Master hired Another Laborer, and yet Another, and the Orders for Chariots multiplied. And the Master Conserved his Shekels and Builded a Great Factory, where he could Hire Many Workmen to Help him. And his Workmen and their Wives and their Children and their Servants had many Gadgets which they had not Known before, and they were Happy.

But it came to Pass that there arose a Malcontent among the Servants, and this Man did Exhort the Laborers, saying: See ye not that the Master maketh Money and Waxeth Rich while we are yet Servants and Laborers?

Come ye, therefore, and Join my Union, and pay me each a Shekel for a Card, that I may know ye are of my Gang, and we will Sit, and Labor not, and we shall Rise Not until the Master hath Recognized our Union, and hath Agreed to give Hire to none except he pay me First a Shekel for a Card, and in due time he shall Pay over to us his Profits.

And while he yet Spake, there were Those among his Fellow-Servants who Demurred and said: How can ye do This? Hath not the Master invented this Chariot, and is he not Entitled to Profit for his Far-Seeing, and for his Stewardship? For know ye not that Others have tried Likewise, and Many are the Would-be Manufacturers that have Fallen by the Wayside?

But the Discontented Servant Pre-vailed upon them, and they Did Sit at their Jobs and Labored Not, neither would they let Another labor in their Place, nor yet allow the Master to send in Others who needed Jobs. And the Fires died under the Boilers, and the Smoke became Stagnant in the Chimneys, and there were no Chariots for Those who would Buy them.

And so the Master arose and went before the King, and said: O King, my Servants and my Laborers are on a Sit-Down Strike; They Toil not, neither do they Spin, and my Machinery Rusteth, and my Materials Spoileth, and my Tools Rust and Corrode, and my Money goeth for WPA, nor is there any Coming in to Carry on the Business. And the King said: Know ye not that This is a New Deal, and the Laborers may Sit whither they Will, and give Thee the Bronx Cheer, and ye shall Take it and Like it?

And the Master said: O King, This is not only a New Deal; it is also a Raw Deal and without doubt a Mis-Deal, and ye may be Sure that at the Next Deal, the Dealer thereof shall Deal with his Sleeves Rolled Up. Once is Enough!

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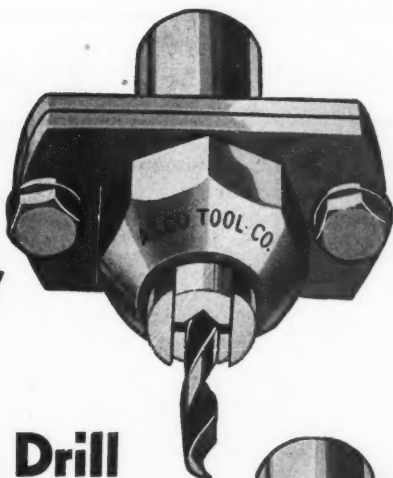
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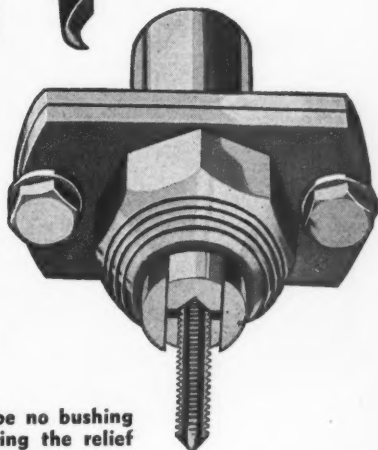
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SINCE no bushings are required, there can be no bushing costs. Your Tool Room will find refreshing the relief from sudden calls for special size bushings for special work. And there'll be no time lost in looking through cans of bushings for the size required, even though you know you have it already made up.

With these new ALCO Tools, you can feel confident that there'll be 100% concentricity. They'll do better work for you at a cost per unit lower than you have ever before been able to reach.

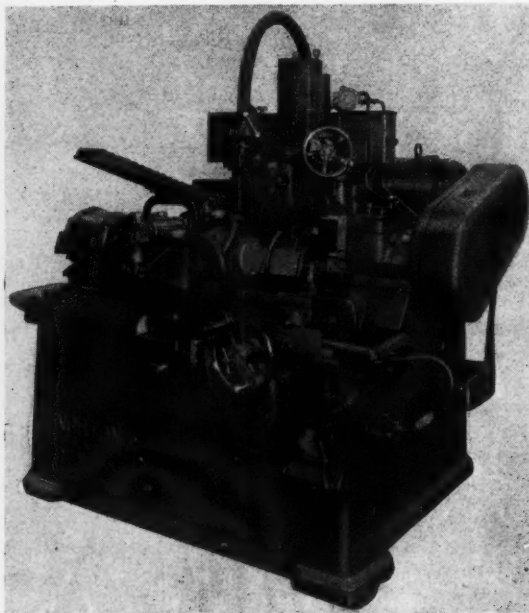
Your request in tonight's mail will bring you complete details which you cannot afford not to consider.

ALCO TOOL COMPANY
BRIDGEPORT **PATS. PENDING** **CONNECTICUT**

New Shop Equipment

Norton 10-In. Type C Automatic Cylindrical Grinder

Norton Company, Worcester, Massachusetts, has developed a specialized, highly productive, wholly automatic arrangement of their well known 10-in.



Norton 10-In. Type C Automatic Cylindrical Grinder

Type C Cylindrical Grinding Machine, designed for plunge-cut grinding operations.

This new machine automatically grinds cylindrical parts concentric with their axes, in large quantities at low cost and with a minimum amount of attention required from the operator. Manual work consists of keeping the machine supplied with work compensating for wheel wear by means of a standard mechanism adjustable to 0.0001 in., and truing the grinding wheel when necessary to maintain the desired fin-

ish. The wheel truing mechanism is built into the wheel guard and is hydraulically operated.

The automatic grinding cycle includes placing of the work in the holding and driving position, grinding to accurate size, releasing the finished piece and dropping it into a return chute. Regulation of the time required for the automatic cycle is by means of a hydraulic valve which may be adjusted at any time during the operation of the machine thus providing a degree of flexibility that closely approximates the skillful craftsmanship of an expert operator on a plain machine.

Safety of operation is an important feature of the machine which is so designed that at the failure of any mechanism to perform its functions all other mechanisms stop, thus automatically signalling for attention.

The type of headstock, footstock and work loading fixtures used vary according to the shape and size of the work and the grinding requirements. A chute type loading fixture is here illustrated arranged for grinding steel bushings internally splined. A hydraulically operated set of fingers at the bottom of the chute picks off one bushing to be ground, advances it between the centers of the two live spindle synchronized work heads while simultaneously removing the previously ground bushing and dropping it into the return chute. The operator keeps the upper chute filled and the finished work from the lower chute drops into a conveniently located receptacle.

Nominal capacity of the machine is 10 in. diameter and 18 in. length. The actual capacity, however, is determined by the work and the design of the work heads and loading mechanism. The number of cycles which the machine

July, 1937
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can perform in a given time is for all practical purposes unlimited. In practice, however, the production rate is determined by the amount of grinding and the degree of finish required.

A grinding wheel 24 in. in diameter and up to 5 in. wide or 20 in diameter up to 7 in wide is employed, driven by a constant speed motor of 10 to 25 h.p. (depending on wheel size) mounted directly on the wheel slide. Two other motors are used. The work drive requires a $\frac{3}{4}$ or 1 h.p. constant speed motor and the drive for the hydraulic lubricating and coolant pumps 3 h.p.

Landis Type BD Plain Hydraulic Grinder

The 10 and 14-in. Type BD Plain Hydraulic Grinder which has been placed on the market by Landis Tool Company, Waynesboro, Pa., is the latest development of this firm for the grinding of relatively long work having small diameter. Tinning rolls, steckel mill rolls, shafts and spindles are representative jobs.

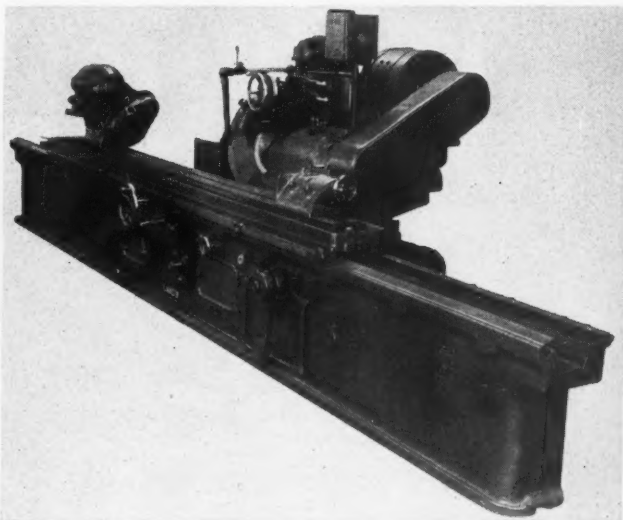
When necessary, the table may be gapped to swing work having projections. This machine supersedes the 10 and 14-in Type B Plain Machine, many of whose features have been retained.

The dynamically-balanced wheel drive motor is mounted on the rear of the wheel base, from which point the drive to the right-hand end of the wheel spindle is through multiple V-belts. This design is said to assure full, smooth delivery of power at all times and provide easy and quick belt change. Babbit-lined steel wheel spindle bearings are used, being flood lubricated continuously with filtered oil. The oil pump is driven by a gear on the spindle, thus assuring lubrication from the moment the wheel spindle starts to rotate. Sight feed valves at the top of the wheel base enables the operator to

check and regulate the flow of oil.

An all-multiple V-belt work drive is a major feature of the headstock. From the motor to the jackshaft and from the jackshaft to the face plate, the drive is through multiple V-belts. One simple adjustment is provided to maintain the proper tension on both drives. The smoothness of a drive of this type is absolutely essential when the high finish demanded for such work as steckel mill rolls has to be secured.

The hydraulic system consists of a



Landis 10 and 14-In. Type BD Plain Hydraulic Grinder

low pressure variable flow pump and a continuous motor. Both are simple in design; all parts run in oil and anti-friction bearings are used. The speed range is from 12 to 240 in. per minute. Throughout this range, traversal is said to be smooth and uniform while reversal is accurate and without shock.

The pump drive motor is mounted at the rear of the bed and drives forward through multiple V-belts to the oil pump which is mounted within the bed. The water pump shaft extends through the bed from the other side and is coupled to the end of the oil pump shaft. The water pump, which is of the centrifugal, self-priming type, is compact, its bearings are fully protected from water, and the suction line is cast integral with the body to elimi-



▶ **NORTON ABRASIVES**

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ORTON

For All Kinds of Jobs
on All Types of Hand Grinders

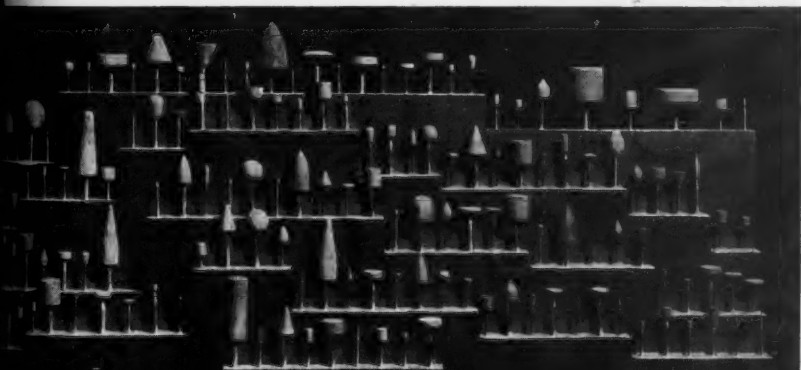
NORTON MOUNTED WHEELS AND MOUNTED POINTS

■ VERY size and shape of mounted wheel and point that you can think of—
■ for the rough, heavy duty jobs—for delicate finishing operations—for elec-
■ tric, pneumatic or flexible shaft grinders—38 Alundum Abrasive is es-
pecially effective on hard, tough die steels, cutting fast and free. For grinding
cast iron, brass, bronze and similar metals, there are points and wheels of sharp
emery abrasive. A catalog describing the complete line of Norton spindle-
mounted products will be sent on request.

NORTON COMPANY,

WORCESTER, MASS.

W-598



NORTON ABRASIVES

nate air leaks. If necessary, a D.C. generator for the headstock motor can be mounted on the rear of the bed in such position that it may be driven by multiple V-belts from the water pump shaft.

The Type BD machine is available in four sizes; 10x96 in., 10x120 in., 14x96 in. and 14x120 in. Net weight of the 10x96-in. machine is 17,800 lbs. Three electric motors are required. The work drive motor on the 10-in. machine is 1 h.p., 500 to 2000 r.p.m. adjustable speed; the horsepower of this motor is increased to 1½ on the 14-in. machines. The wheel drive motor is a 15 to 20 h.p., 1150 r.p.m. constant speed unit and the pump drive motor is a 5 h.p. 1150 r.p.m. constant speed motor.

Cincinnati Wet Abrasive Cut-Off Machine

The Cincinnati Electrical Tool Company, Cincinnati, Ohio, has announced a wet abrasive cut-off machine suitable for straight or angle cutting of practically any material encountered in general manufacturing, including steel alloys, non-ferrous metals such as brass, copper, aluminum, as well as fibrous

and plastic materials in various sizes, angles and shapes. The wet cutting feature is said to not only greatly increase the life of the abrasive cut-off wheels, but also to produce a cut with a minimum of burr and to eliminate burning because the coolant is directed on the sides of the wheel as well as on the point of contact of the cut.

The machine is suitable for making straight or angle cuts in solids up to 2¼-in. or tubing up to 3½-in. diameter the same vise being adaptable for the various cuts. In cutting angles up to 45 deg., however, the maximum capacity is 2¼-in. Graduations on the table make angle-cutting fast and accurate.

The material is held in the vise by spring tension on the jaws and the work is released by the foot lever after the cut is completed, leaving the operator's hands free at all times. The work is held securely on both sides of the cut, thus eliminating the possibility of cramping of work and preventing wheel breakage. The abrasive wheel is moved into the work by means of a hand lever and the arm which carries the abrasive wheel pivots on the pedestal with counterbalance for easy operation. The abrasive cut-off wheel is completely guarded, with the exception of that por-

STEEL

of Every Kind . . for
Every Purpose . . in Stock . . Ready to Use

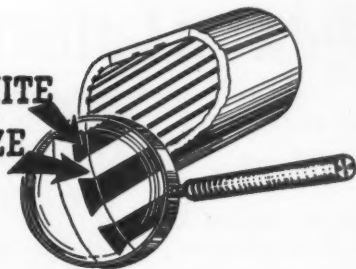
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THE Johnson method of combining Graphite and Bronze provides from 40 to 45% graphite contact with the shaft. This provides an exceptionally large area of graphite without weakening the bearing structure or strength.

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Midwest Cutters

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Correctly designed to cut freely, eliminate chatter, and provide ample chip clearance.



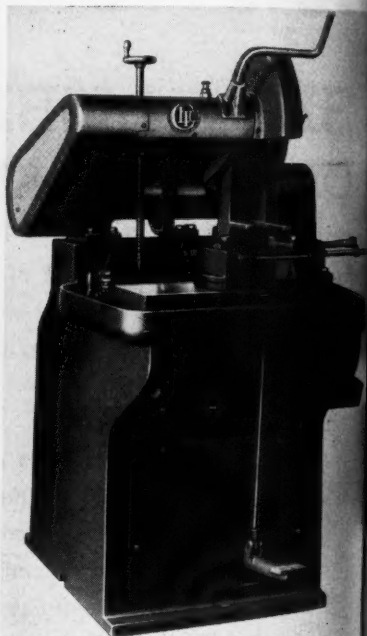
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**Midwest Tool
& Mfg. Co.**

2358 W. Jefferson
Detroit, Mich.

tion necessary for the actual cutting operation, affording protection to the operator.

A stop is provided which can be set for any depth of cut within the machine's capacity, and a longitudinal stop is provided for regulating the length of the material to be cut. Two sets of wheel flanges in different sizes are furnished to ensure the maximum use of the abrasive wheels. A shaft-locking device facilitates changing of wheels.



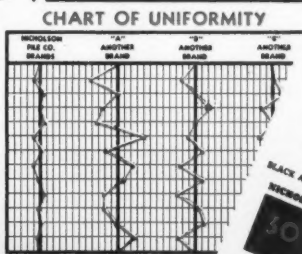
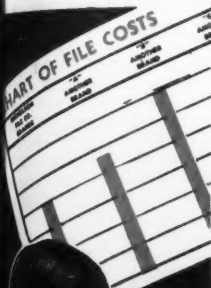
Cincinnati Wet Abrasive Cut-Off Machine

The coolant system consists of a $\frac{1}{4}$ h.p. direct motor-driven centrifugal pump with 10-gal. tank, piping and conveniently located control valve.

The spindle is of nickel, mounted on sealed-type deep groove ball bearings running in oil. Labyrinth seals are provided to prevent the ingress of grit or dirt into the bearing housings. A conveniently located drain plug facilitates oil renewal. The spindle is driven by multiple V-belts from a $7\frac{1}{2}$ h.p. ball bearing drip-proof motor, 1800 r.p.m. mounted in the pedestal with magnetic starter with overload and no voltage protection and push-button control.

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Michigan Universal Gear Lapping Machine

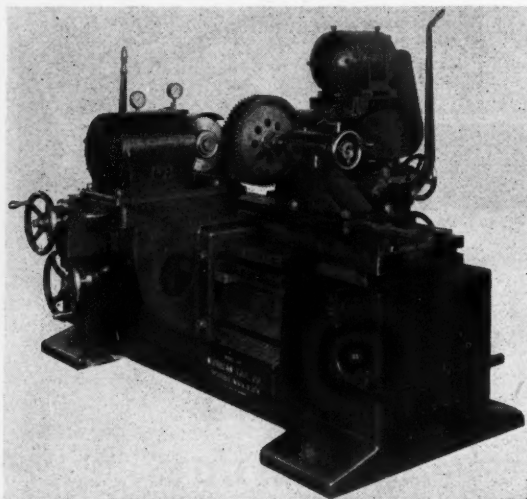
A new crossed-axes gear-lapping machine—the Michigan Universal—is announced by Michigan Tool Company, 7171 E. McNicholas Road, Detroit, Mich. The machine is designed for maximum

for gears of entirely different characteristics, involving a change of laps.

The machine is a duplex type, with two laps which may be used either for lapping front and back side of gear teeth at the same time, with the machine running in one direction only, or may be set to lap two separate gears as on a cluster—simultaneously. This duplex type of operation makes possible a reduction in lapping cost up to 50 per cent, cutting handling time in half and increasing production rate proportionately. Thus in addition to being designed ideally for shorter runs of a variety of gears it is also highly efficient as a mass production machine.

The machine comes equipped with an automatic cycle control mechanism adjustable to permit setting the lapping cycle at anything from five seconds to 10 minutes in both directions—the machine running first in one direction, then reversing, running the same length of time in the other direction and then stopping for re-loading.

It will be noted from the illustration that the two laps are located at either side of the work. The lap on the back of the machine is the driving member, being driven through a 3 h.p., 1140 r.p.m. motor. The work is mounted either between centers or on an arbor. The centers are mounted on a reciprocating table the stroke of which can be set to anything up to 5 in. The table is driven through a second 3 h.p., 1140



Michigan University Lapping Machine Set Up For Simultaneously Lapping Both Sides of Herringbone Gear

flexibility where a variety of gears are to be lapped.

It will lap gears ranging from 1½ in. to 20 in. in diameter, and clusters up to 30 in. in length. Change-over time for gears of the same pitch and helix angle is about five minutes, while about 20 minutes is ample for changing over

the driving member, being driven through a 3 h.p., 1140 r.p.m. motor. The work is mounted either between centers or on an arbor. The centers are mounted on a reciprocating table the stroke of which can be set to anything up to 5 in. The table is driven through a second 3 h.p., 1140



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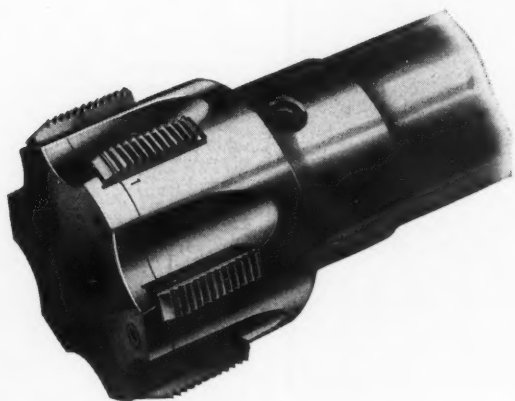
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Solid taps wear down and lose their accuracy—but a Geometric Class SJ Solid Adjustable Tap is restored to size with a simple adjustment. The last unit of a long run is identical with the first. Removable chasers in the Class SJ Tap are easily resharpener—for longer life and cleaner cutting. A single tool will cut a wide range of sizes, requiring only a separate set of inexpensive chasers for each size. Eleven tools are carried in stock to cut from 1 5/16" to 8 1/2", with larger sizes to order.

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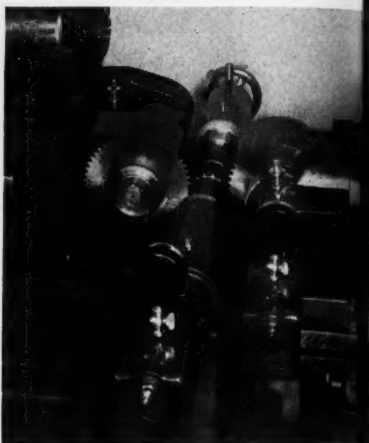
It will pay you to investigate these coolant pumps that give you quiet, low cost service.

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r.p.m. motor. The work itself drives the second lap at the front of the machine which lap in turn is provided with an adjustable hydraulic brake for establishing the correct lapping pressure between laps and gear teeth.

The mounting of the laps is such that they may be set at varying angles to the axis of the gear being lapped (crossed-axes lapping). Further, both lapping heads are mounted on slides so that they may be moved to any position desired. Lapping two gears of dif-



Closeup of Michigan Universal Lapper Showing How Both Front and Back Tooth Form a Gear may be Lapped Without Reversing the Machine

ferent diameters simultaneously is the made possible in a simple manner.

Primary adjustment for position of the laps is through handwheels and screws. For unloading and after loading a hand lever throws the

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Priced low, still built to industrial standards. 123 Grinder is a lighter, (all aluminum) handied, hand or lathe tool. Universal Motors take grinding wheels to 1 3/4". In case with collet, wrench and three wheels.

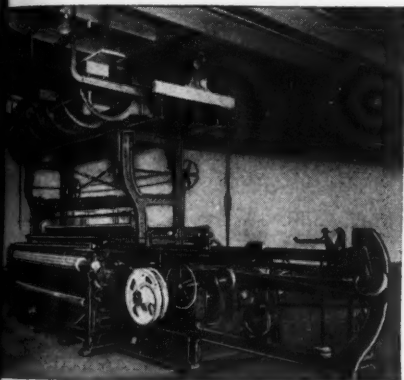
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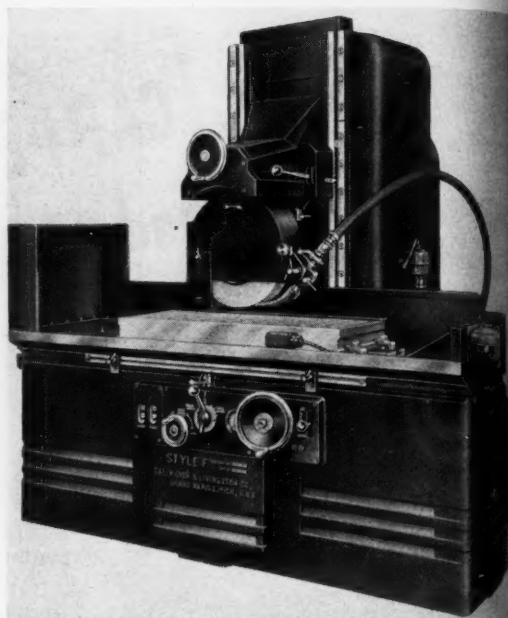
Baldwin-Duckworth installations help make profits not only in textile machinery but in all industrial applications where dependable, economical power transmission, elevating or conveying is required. Our catalog lists all standard chains, sprockets and contains valuable technical information. Send for a copy. Baldwin-Duckworth Chain Corporation, Springfield, Mass.

BALDWIN DUCKWORTH

lap out of engagement and returns it into proper position, the lap head being brought up against stops for accurate re-locating. Thus the driving lap is left at proper center distance, facilitating re-loading since the driving lap and gear to be lapped will be correctly meshed during loading. The front lap then will come back into mesh with the new gear exactly as it was taken out of mesh with the gear just removed. The machine is equipped with suitable pick-off change gears to obtain any lap speed or table reciprocating speed that may be required.

G & L High Speed Cross Traveling Head Type Hydraulic Feed Grinder

The illustration shows a hydraulic feed surface grinder of the high speed cross traveling head type which has been developed by Gallmeyer & Livingston Co., 308 Straight Ave., S. W., Grand Rapids, Mich. The machine illustrated is built with a table having 16x48-in. working surface, but other widths and lengths are available. The table speed can be varied indefinitely from practically nothing up to a maximum of 100 ft. per minute, when the machine is driven by a 60 cycle motor. The starting and stopping of the table and the control of

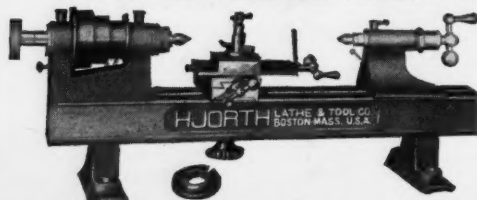


Gallmeyer & Livingston High Speed Cross Traveling Head Type Hydraulic Feed Surface Grinder

speed in this infinite variation is means of the lever in the center of the front valve plate, which operates in approximately a 90 deg. arc between the stopped position and full speed.

The base of the machine is a heavy rugged one-piece casting of twice the length of the working surface of the table so that the table never overhangs the base. The upright column which carries the vertical sliding head is a one-piece casting of exceptional rigidity.

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The Hjorth Bench Lathe has the speed, accuracy, handling ease, and dependability that appeals to every operator. That's why you'll find the better shops equipping with the Hjorth Lathe.

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Vertical Turret Lathes are built in five sizes—24", 36", 42",
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Tooling combined with methodical operation and use of
 the machining method with Cost Saving Ability



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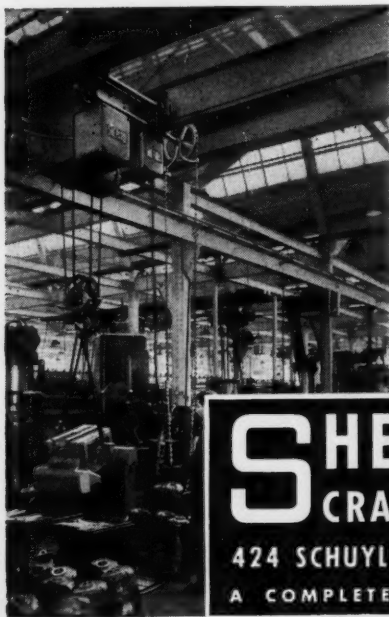
keyed, bolted and doweled to the base member. Maximum stiffness is obtained by thick ribs properly designed.

The cross traveling spindle slide has a movement equivalent to the working surface of either 16 or 18 in. Thus a 4-in. standard width of wheel overruns the working surface 2 in. on both the front and back edges of the table. The cross traveling movement normally operates at each reversal of the table and the amount of movement can be set at any amount from less than 1/32 in. up to 2 in. for each reciprocation of the table. The amount of cross travel is controlled by a small handwheel in the valve plate. By disconnecting the wheel, which can be done instantly, the head can be cross traveled by hand. When it is desired to dress the wheel, the lever which normally controls the table movement can be thrown to left of center where it will operate the cross movement in a continuous manner in any desired speed. Spindle construction is of a special ball bearing flanged type with an adjustable amount of pre-load. The spindle is of heat treated special alloy steel and of extremely generous dimensions. The standard spindle drive is by means of a 1150 r.p.m., 25 h.p. motor which drives the spindle directly

through a splined end; thus the cross traveling mechanism is relieved of carrying the weight of the motor. The 16- and 18-in. machines are regularly equipped with a 20-in. diameter grinding wheel with 4-in. face, but other sizes can be furnished upon special order. The capacity of the full 20-in. diameter wheel is 17 in. Additional vertical capacity can be provided if required.

Power elevation of the vertically moving head slide is provided as standard equipment, operated by a 1/2 h.p. motor which is controlled by a double throw switch at the right of the central valve plate. When the switch handle is up the head travels up and when the switch handle is down, the head travels down. When hand pressure on the switch is released, it automatically throws to the central position. Vertical movement of the wheel head, in actual grinding operation is controlled by the large handwheel at the front of the base.

A coolant system for providing adequate flow of coolant is standard equipment. The coolant tank is positioned in the corner formed by the front of the base and the upright column on the left side of the machine, but is a separate portable unit on a roller base to facilitate removal for cleaning. The



Inner-Running Trolley Cranes

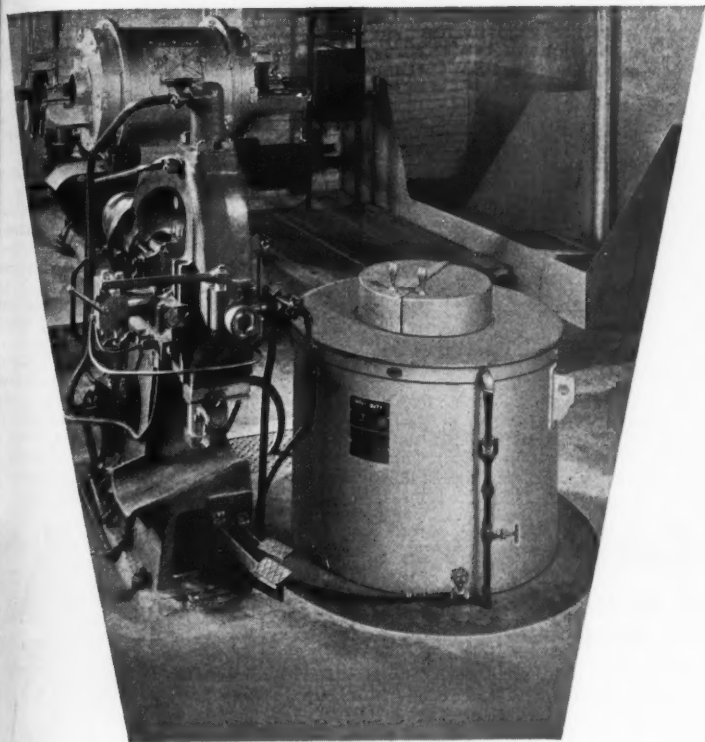
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HEVI DUTY ELECTRIC COMPANY

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coolant pump is operated by an independent motor.

The hydraulic oil supply tank is mounted in the base of the machine with convenient access for filling, draining and checking the oil supply. The hydraulic pressure is continuously registered by a pressure gage in the main valve plate to the right of center. Convenient access to the hydraulic mechanism is provided. Automatic forced feed lubrication of the table ways is provided from the pressure line and the return lubricant is filtered. All other points requiring lubrication are provided for by means of a Bijur one-shot system. One push on the handle provides sufficient lubrication for a full day's operation. All operating controls are at the center of the base, easily accessible to the operator's position.

No. 2U Reed-Prentice Universal Milling Machine

The illustration shows the No. 2U Reed-Prentice Universal Milling Machine which has been brought out by Reed-Prentice Corporation, Worcester, Mass. The machine is particularly adapted for

general tool and die work. The universal self-contained motor driven facilitates milling, drilling and turning at all angles. Any angle can be obtained up to 60 deg. parallel with cross feed from center toward the umn and any angle 30 deg. from center toward the front of the machine. Spindle is heat treated and ground, is machined to take a No. 2 Morse or No. 7 B & S taper. The quill is treated with a special chromium process, giving it a surface hardness point below the hardness of a diamond.

The entire machine is ruggedly being designed to preclude the possibility of vibration. All castings are a high percentage of steel. A steel guard in the top of the knee protects the cross feed screw from chips at front and a heavy leather curtain is provided at the rear. The saddle covers the full length of the table, forming rigid table support. The saddle is securely gibbed to the knee. All screws are supplied with ball thrust bearings insuring ease of operation of the saddle and table. The longitudinal screw nut is adjustable for wear. The screws are chrome molybdenum with nuts made from special

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20" Sliding Head Motor Driven Drill For Production or Precision Drilling

Here's another rugged and well-balanced Canedy-Otto Drill—precision built from the ground up to give fast, accurate drilling. Vertical Motor Drive provides simplified construction. Driving units are completely equipped with Timken Roller Bearings, the motor and motor cone pulley with ball bearings, and the spindle cone with roller bearings.

Drills are equipped with push button control and magnetic switch. Desired belt tension is easily obtained with convenient, simple arrangement. Self feed is accurate and powerful. Four changes of feed can be had while drill is operating. Capacity for $\frac{7}{8}$ " drills without back gear— $1\frac{1}{4}$ " with back gear.

Furnished in single, two, three and four spindle type— $15\frac{3}{4}$ " center distance of spindles.

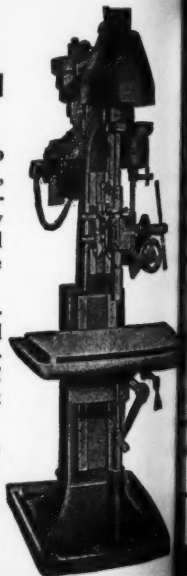
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A LABORATORY CYCLONE

As a result of the widespread success of the Cyclone Furnace in commercial operations, Lindberg extended this superior heating principle to a convenient size working unit, ideally adapted for testing purposes and for tempering small tools and special parts. The Laboratory Cyclone is identical in operation to the production Cyclone Furnace, and it gives the same precision results. The work chamber measures eight inches in diameter by ten inches deep, and is provided with a plug type cover which is easily lifted off for inserting the charge. The electric heating elements are mounted in a separate chamber, thereby eliminating direct radiation to the charge. Powerful air circulation assures rapid, uniform heating.

This new type Cyclone meets all modern requirements as an accurate and inexpensive pilot furnace for checking up production, predetermining response to specified heat treatments and for laboratory investigation work—as well as for tempering individual steel parts.



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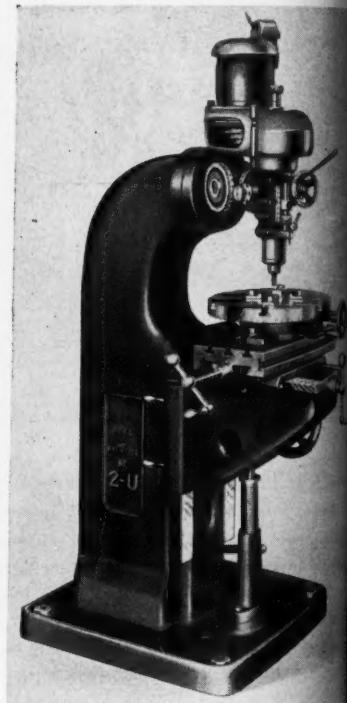
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led phosphor bronze.

The circular table is 15 in. in diameter, accurately graduated to 360 degrees with an index pointer and is supplied with four 5/8-in. T-slots. Operation by handwheel and double worm and worm gear of proper pitch for the greatest variety of work. The worm can be disengaged, making it possible to rotate the table freely by hand. Where desired, universal or independent clutches can be fitted to the table or direct



No. 2U. Reed-Prentice Universal Milling Machine

the rotary base.

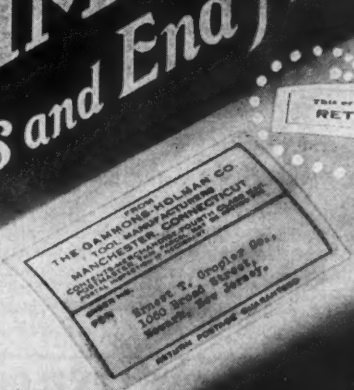
The table is 20 1/4 x 8 3/8 in. Length of carriage, 16 1/2 in. Diameter of work surface of rotary table, 15 in. Longitudinal feed, 16 in; cross feed, 11 in. Vertical feed of knee, 15 in. Height of machine, 5 ft. Floor space required, 40 x 34 in. Weight of machine with rotary table, net, approximately 75 lbs. Rotary table, 75 pounds.

July, 19

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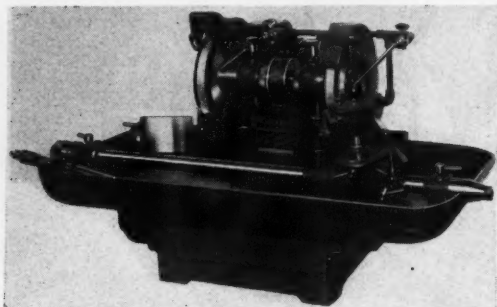
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Agathon Type 150 Grinding and Lapping Machine

Russell, Holbrook & Henderson, Inc.,
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Agathon Type 150 Grinding and Lapping Machine

marketing the Agathon Type 150 Grinding and Lapping Machine which has been designed especially for the correct and safe grinding and lapping of cemented carbide tipped tools. Inasmuch as the grinding and lapping of cemented

carbide requires a machine of the utmost precision, running without vibration this machine has been developed with these requirements in mind, not only in the spindle and bearing construction but also in the method of supporting the work and transferring from roughing to finishing wheels.

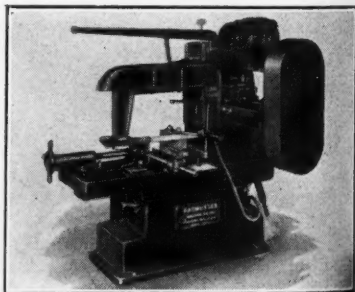
The machine is of sturdy construction, the frame comprising an ample sump and tray intended for mounting on a bench or suitable pedestal. The motor bracket is so constructed as to provide means for adjusting the belt tension. The pump is driven from the motor pulley. Vibrationless operation is insured by the stability of the wheelhead and the glass hard nitralloy spindle which is carried in bearings of high grade phosphor bronze. The arrangement of the bearings and felt seals provides for reliable protection against the intrusion of dust or coolant. The spindle pulley is located between the bearings.

While any type of grinding wheel may be used, diamond wheels are preferred.

THE NEWEST DEVELOPMENT IN METAL SAWING MACHINES

CAPACITY $6'' \times 6''$
 $10'' \times 10''$

Swivels on base for angular cuts—three speeds by V-belt—saw guide of parallel type—saw frame has 4 large, self-aligning shoes, unaffected by excessive tightening of saw blade—vise graduated to 45°—feed is compensating type.



Also built as FULL AUTOMATIC.
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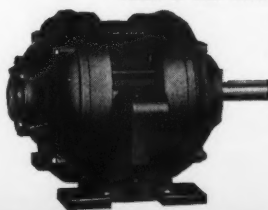
ALL IS NOT *Gold* THAT GLITTERS

... nor are all motors sturdy, even though they may appear very similar. . . . You scratch an object that glitters to determine whether it is gold or not. You examine a motor carefully, critically to determine whether it is sturdy or not—and sturdiness in a motor means long life and minimum maintenance costs during that life. Carefully, critically examine Allis-Chalmers Motors and you will find ample insulation, with a big added margin for mechanical durability . . . cast steel frames . . . rugged cast iron housings . . . heavy bearing enclosures . . . studied use of steel throughout. Those are the things that make Allis-Chalmers Motors the sturdiest motors on the market—bar none.

And cast steel construction in motors is nothing new, nothing experimental with Allis-Chalmers. We have always recognized the value of cast steel parts in motor construction, because of their inherent strength and rigidity, and have used them in our motors for many years.

Allis-Chalmers Motors are the best motor buy on the market. For further information write for Leaflet 2173.

The Allis-Chalmers Mfg. Co. builds standard motors of every type from 1 hp. up—also motors for special application.



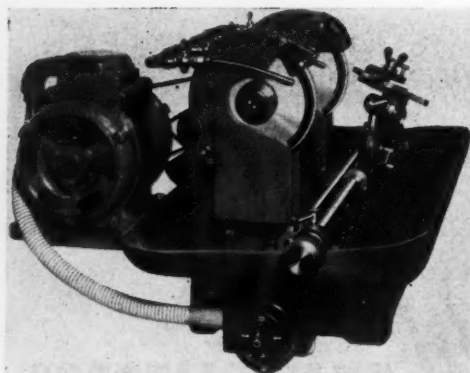
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MOTOR DIVISION

ALLIS-CHALMERS



MILWAUKEE, WISCONSIN



Side View of Machine Showing Operating Mechanism

These are furnished in two grades; one for rough grinding and the other for finish grinding or lapping. Each wheel has a working surface on each side. The rim width of each wheel is 0.40 in. on a diameter of 6 in., and a diamond depth on each side of 0.160 in. for the roughing and 0.080 in. on the finishing

wheel. For cutting off or parting of cemented carbides, a suitable thin diamond wheel is supplied. Where aluminous abrasive wheels are used, the wheel is of the double cap shape, of corresponding dimensions.

The compound angle toolrest can be angularly adjusted in all directions, and clear reading scales are provided for setting. The grinding is done by rocking the toolrest on the bar, clearing the rim at each movement. The bar, which is hardened and ground, is furnished with a fine micrometer feed so that final feeds of very light proportion can be taken. By releasing the tool clasp and holding the tool lightly against the ground surface of the toolrest, a free-hand action may be obtained, if desired, but preserving absolutely both the form and relief angles.

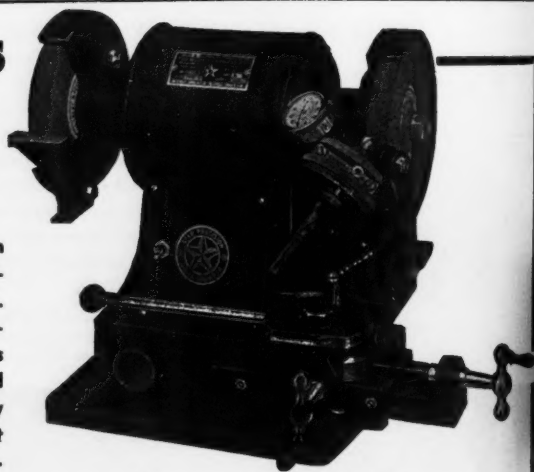
Inasmuch as the toolrest slides on a hardened and ground bar, the work can be transferred from the roughing to the finishing wheel without disturbing the setting. An opposed angle can be ground by changing the setting and repeating the above process on the oppo-

Grinds

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This Star Precision Grinder puts drill grinding on a production basis. Its simplicity and accuracy saves as high as 50% on drill costs and insures uniform accuracy that guarantees perfect holes and increases production.



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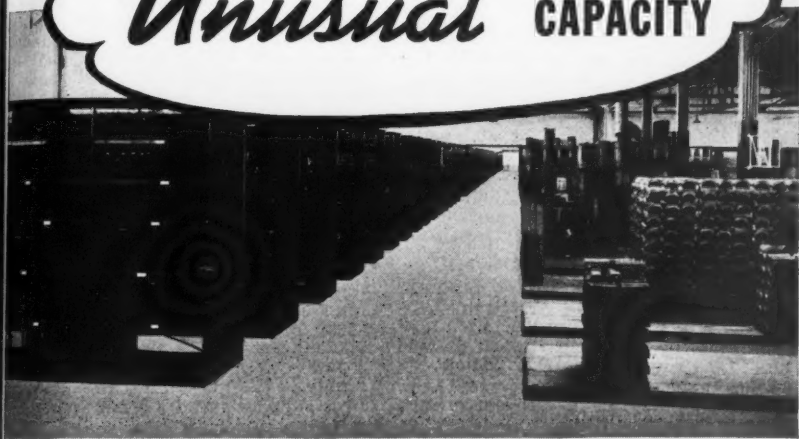
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site sides of both wheels, thus preserving the distinct advantage of always grinding down on the work without reversing the rotation of the wheel.

A toolrest, supplied as standard equipment with the machine, will take a shank up to $\frac{1}{2}$ in. square, and a larger toolrest, taking up to $1\frac{1}{8}$ in. square, can be supplied on request. A flat inclinable table, interchangeable with the toolrest is provided as standard equipment.

The machine takes a standard $\frac{1}{2}$ h.p., 1725 r.p.m. motor with a shaft expansion of $\frac{3}{4}$ -in. diameter and $3/16 \times 3/32$ -in. keyway. A machined pad is provided for the switch.

American Type PD Hydraulic Broaching Machine

Designed especially for fast, accurate internal broaching, the American Type PD Hydraulic Broaching Machine, now being built by American Broach & Machine Company, Ann Arbor, Mich., is simple in construction, easily set up, and can be operated at high speed with safety. Certain distinctive features of American design and construction are said to make the machine unusually

compact, durable, easy to operate and economical.

The ram, hydraulic cylinder, and accurately machined slide ways are cast integral, a feature which is said to provide a long stroke with a relatively low column height which brings the work support to a position most convenient for easy work-handling. The hydraulic cylinder has a highly accurate and finely finished bore to which the piston is closely fitted, thus insuring most efficient application of power to the broach, smooth cutting, and uniformly rapid return.

The long slide ways of the ram cylinder casting bear upon bars of hardened and ground steel carefully fitted and solidly secured to the rigid frame at the front and on both sides. Similar bars form caps at the rear of the bearing so that the slide ways are entirely surrounded by hardened and ground steel throughout their entire travel.

Completely submerged in oil in a separate compartment of the base, the highly efficient Sundstrand Hydraulic Unit supplies uniform oil flow at correct pressures and in suitable volume for the smooth, powerful cutting stroke and rapid return. The hydraulic circuit in-



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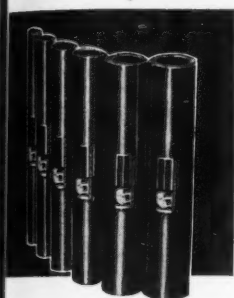
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cludes an adjustable safety valve, has a minimum of connections, and is precisely controlled by a four-way valve.

The American Automatic Broach Puller, convenient loading height, and safety controls make for rapid and safe operation of the machine. After placing a work-piece on the pressure plate with the broach through the work and locked in the pulling head, the operator places his right hand on the operating lever



American Type PD Hydraulic Broaching Machine

and his left on the safety lever. Both levers must be pressed at the same time to operate the machine. The machine is readily changed from one type of job to another simply by substituting a suitable broach guide and broach. Stroke length is easily adjusted. A fan-type gage indicates pressure in the hydraulic circuit.

Automatic pressure lubrication is provided for the ram slide ways, also for all of the other bearings in the machine. A copious supply of clean coolant is pumped to the work from a reservoir at the base of the machine, which is separated from the chip compartment by a

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Hydraulic power as applied and controlled in Farrel Hydraulic Presses provides the simplest, smoothest and most adaptable force for exerting uniform pressures with maximum accuracy in metal forming.

Readily adjustable control permits a wide range of pressures, providing a high degree of flexibility and selectivity in the pressures required for different operations and different metals.

The smooth, even application of fluid power reduces metal tearing and spring-back to a minimum. There are fewer press-overs and rejects. Life of dies is prolonged. Less time is lost in subsequent assembly operations.

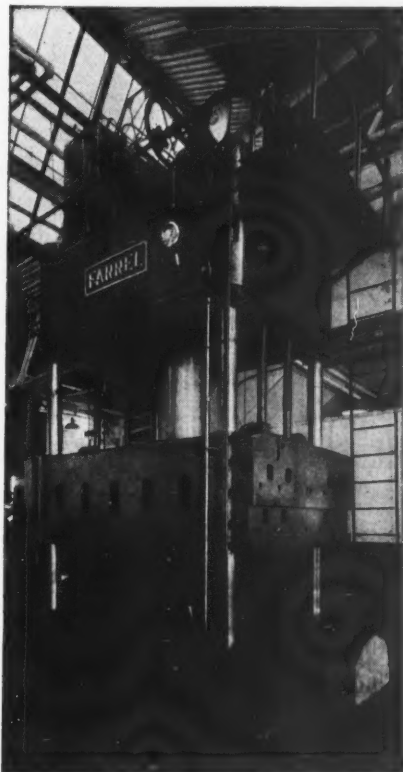
Farrel Hydraulic Metal Forming Presses are designed for high speed, automatic or semi-automatic operation, with uniform pressure on every piece and an exact visible indication of what that pressure is. Their design and construction make possible continuous high output at low operating and maintenance cost.

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Our Bulletin No. 263 describes in detail the advantages of the hydraulic press for metal forming. Your copy will be sent on request.



Farrel Hydraulic Metal Forming Press with self-contained oil power unit mounted on top of the press. 500 tons maximum capacity, stroke and opening adjustable up to 36" and 60", respectively. Platen area 80"x126", with provision for future extension.

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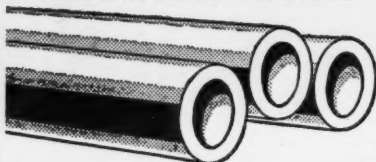
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series of baffle plates.

Power is transmitted direct to the shaft of the hydraulic unit through multiple V-belts operating from a standard 5 h.p., 1800 r.p.m. motor. The motor is mounted behind the column on an adjustable leaf supported by the housing of the hydraulic equipment. The entire drive to the hydraulic unit and coolant pump is completely enclosed by a substantial guard.

The capacity of the machine is four tons. The maximum stroke is 22 in. The cutting speed per minute is 30 ft. and the return speed is 40 ft. Size of

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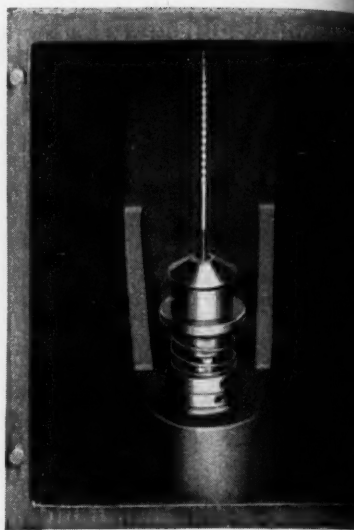
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View of American Automatic Broach Puller
Extreme Lower Position

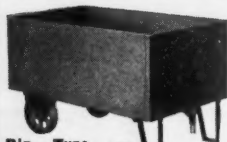
work plate, 7x12 in. Height of work plate from floor, 29 in. Oil reserve capacity, 35 gal. Coolant pump capacity per minute, 7 gal. Floor space required, 2½x4 ft. Height overall, 6 ft. Weight, net, including motor, 2500 pounds.

Rockford Double-Housing Hy-Draulic Planer

Designed for heavy duty, the Double Housing Hy-Draulic Planer shown in the illustration—product of Rockford Machine Tool Co., Rockford, Ill.—has many important features which are intended to reduce costs, increase production and improve quality on a variety of work.

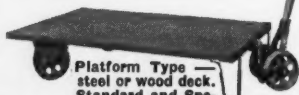
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July, 1958

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To produce threads of materially greater accuracy, at production costs which compare favorably with less accurate methods now in common use: this was Ex-Cell-O's objective in its years of developing and perfecting the Ex-Cell-O Precision Thread Grinders. Now it is possible to grind from solid hardened blanks and to hold lead error to .0002" per inch. Use of the wet grinding method and long-life 18" wheels makes for extreme accuracy and grinding wheel economy.

An important feature of these Precision Thread Grinders is their flexibility, their adaptability to a wide range of work including either right or left-hand threads on screws, taps, chasers, or worms, both as gauges and production parts. Complete information will be mailed upon request.



- ☐ Drill Jig Bushings
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- ☐ Carbide Tool Grinders
- ☐ Precision Boring Machines
- ☐ Precision Thread Grinders
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- ☐ XLO Carbide Tipped Tools

EX-CELL-O CORPORATION, DETROIT, MICHIGAN

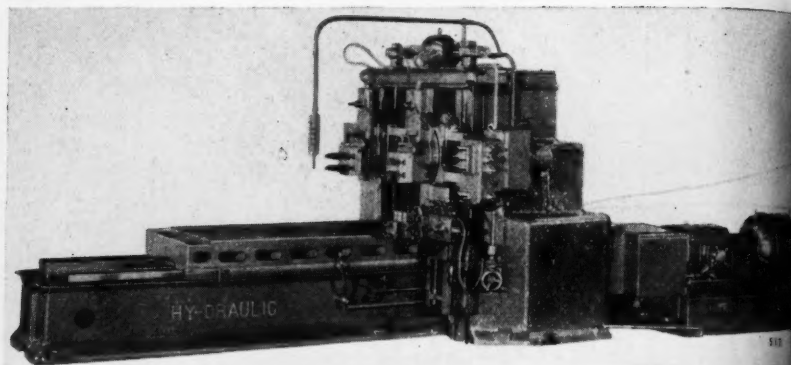
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Rockford Double-Housing Hy-Draulic Planer

ent in the use of a reversing electric motor, the Hy-Draulic Planer employs a standard constant speed motor, with relatively simple controls, for driving the hydraulic unit. With this drive the cutting speed of the table reaches the selected rate almost instantly and remains constant throughout the entire cutting stroke. Reversals of the table movement are quick and smooth. Cutting speeds are independent of return speeds and both have infinite adjustment between high and low limits. There is no mechanical connection between the motor and the table, and it is said that the hydraulic drive increases the life of the cutting tools 50 per cent between grindings.

The table can be stopped, inched, or reversed at any point in its travel. The few fast-moving parts which are subject to wear are submerged in oil or pressure lubricated. The cross feed to the heads is also hydraulic.

Push button control is provided for

the direction of rapid traverse for the heads, elevation or lowering of the master motor switch and instant stopping of the machine, the push buttons being located in a pendant suspended over the machine table. Power elevation of the rail operates in conjunction with the automatic hydraulic rail clamp. The cross rail is supported on massive columns which are accurately keyed, dovetailed and solidly secured to the bed. Power rapid traverse to all heads in both directions is provided by a direct connected motor. The hydraulic control panel is completely enclosed but readily accessible. Bed ways are lubricated by twice-filtered oil under pressure from a powerful group. The modern one-pressure lubrication system is used for the rail heads, side heads and feed units.

The main driving motor is direct connected to the hydraulic power unit, being mounted on a heavy base solidly secured in position. Duplicate controls are provided for the table movement and

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VASCOLOY- RAMET BLANKS

Vascoloy-Ramet is available in three forms, (a) completely finished tools, (b) milled and brazed tools, and (c) blanks. V-R blanks are furnished in 5 standard styles and in sizes to meet every requirement. To make tools with V-R blanks is a simple operation, fully described in a new instruction booklet, available free — upon request.

Turning a slotted bar of heat treated Chrome Vanadium Steel, quenched and drawn to 44 Brinell, using a Vascoloy-Ramet tip, grade EE, brazed on a Silman steel shank without milling a recess.

Vascoloy-Ramet	Feet Per Min.	Feed	Depth
Grade EE	150	.032"	1/16 to 3/32"

Intermittent cutting — a hard alloy steel shaft, 364 Brinell, with a $\frac{3}{4}$ inch slot — striking the cutting tool 15 times a minute!

Experts said no tool material would operate under such conditions.

But Vascoloy-Ramet, grade EE, turned the shaft with precision and finished with the cutting edge unamaged. Further, this tool was tipped without milling a recess, the V-R blank being brazed with Tobin bronze on a shank of Silman tool steel.

Vascoloy-Ramet is produced in 17 standard grades, of different tantalum carbide content, strength and hardness, to cover the entire range of machinable materials and machining needs.

Today, great industrial plants and small machine shops, as well, are finding "a grade for every use" the secret of faster production, more pieces per grind and lower operating costs.

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A GRADE FOR EVERY USE

adjustment of rail heads. Three levers provide complete control for power operated movement of both rail heads including feed or rapid traverse, right or left, up or down, separately or in unison, and the side heads have similar controls. Electrically operated hydraulic rail clamps are provided. Pressing a button on the pendant releases the clamps and automatically raises or lowers the rail. Releasing the button stops the rail and automatically clamps it securely in position. Hydraulic tool lifters, smooth in action, do not tend to jar tool slides out of adjustment.

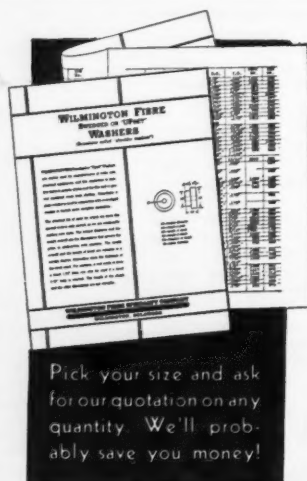
The size of the machine is 48x48 in. The standard lengths of the table are 9, 11, 13, 15, 17 and 19 ft. and the lengths of the stroke are one foot less in each instance. The table is 44 in. wide. Maximum distance of table to rail, 48½ in. Maximum travel of left hand or right hand rail head, 55 in. Maximum vertical travel of rail head tool, 12 in. The horizontal feed can be regulated to any desired amount from 0.024 in. to 0.500 in. and the vertical feed can be adjusted to any desired amount from 0.010 in. to 0.250 in. Horizontal adjustment of side head, 11 inches.

For heavy duty, the table cutting

speed can be regulated to any desired rate from 0 to 40 ft. per minute and the return speed to any rate from 10 to 150 ft. per minute. The maximum table pull is 30,000 lbs. For medium duty the table cutting speed can be set from 0 to 50 ft. per minute and the return speed from 10 to 150 ft. per minute. Maximum table pull, 24,000 lbs. For light duty, the table cutting speed can be set from 0 to 80 ft. per minute and the return speed from 10 to 150 ft. per minute. Maximum table pull, 15,000 lbs. Approximate net weight of 10-ft. machine, less electrical equipment, 54,000 lbs. Approximate net weight of each additional two feet of table, 450 lbs. The electrical equipment (supplied or ordered by customer) includes a 4 h.p., 900 r.p.m. master motor, 2 h.p., 1050 r.p.m. rail elevation motor, 1 h.p., 1050 r.p.m. traverse motor, and special pendant hydraulic planer control.

Ames Enclosed Head Precision Bench Lathe No. EH3

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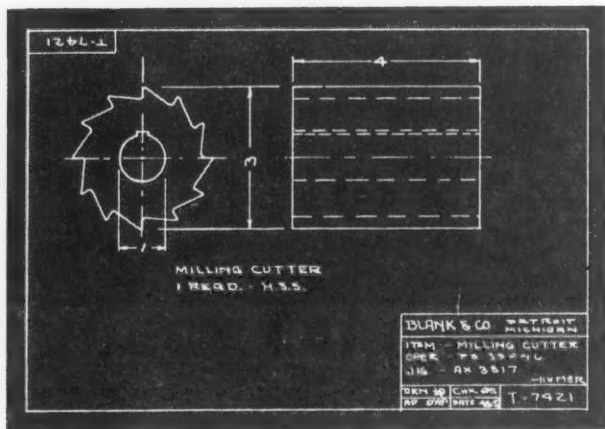
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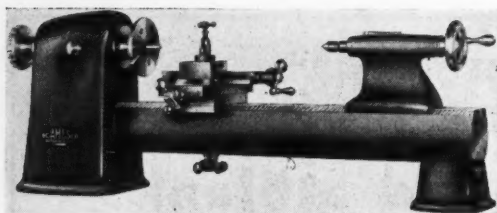
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Ames Enclosed Head Precision Bench Lathe No. EH3

of accuracy are combined has been placed on the market by B. C. Ames Co., Waltham, Massachusetts.

Among the qualities inherent in the design of this lathe are a true-turning spindle, wide range of spindle speeds, perfect center alignment, a true bed, and accurate compound slide rest. The lathe is easy to set up for short jobs, starts and stops quickly, has a contained motor drive, and is easily moved around the shop.

The outstanding feature of the lathe is the Transitorq drive—an exceptionally compact unit that provides an infinite variety of speed changes by means of a handwheel control. Using a $\frac{1}{2}$ h.p.

A.C. or D.C. motor, spindle speeds from 200 to 2000 r.p.m. are obtainable, or other combinations according to diameters of pulleys used. The lathe and Transitorq are connected by twin V-belts which are tightened by lowering the Transitorq. No adjustments of the Transitorq are ever required. The lathe and Transitorq are mounted on an ordinary shop bench or on a specially constructed bench having steel legs and a wood top.

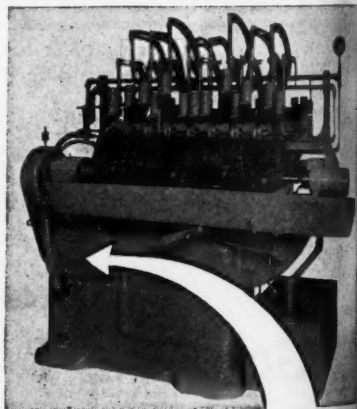
The detachable headstock is also a feature of this lathe. The headstock is fully enclosed, has double V-belt drive, preloaded super precision ball bearings, hardened and ground alloy steel spindle, locking pin conveniently located on the front side, ball thrust for drawbar spindle, and is accurately hand-scraped to fit the bed. The entire headstock assembly can be taken apart and put together again in a few minutes.

The bed is cored to reduce weight, webbed for strength, has a T-slot to hold attachments and is accurately hand-scraped. The bottom surfaces are machined so that the bed is held flat

PULLMORE CLUTCHES Used In Hydraulic Lapping Machines

The A. P. Schreiner Company use No. 3 Single-type Pullmore Clutches, running in oil, in their improved Model B Hydraulic Lapping Machines. These machines are used for high-production work, every unit in their construction must be absolutely reliable and operate continuously with a minimum of attention. Pullmore Clutches have proved highly satisfactory in these machines because they are reliable, efficient, durable; easily adjusted when this eventually becomes necessary.

New Booklet—Contains complete information on sizes, dimensions and capacities of Pullmore Clutches; drawings of typical applications; twenty illustrations of equipment using Pullmore Clutches; brief information on Rockford O-C Toggle Type and Spring-Loaded Clutches. Engineers, designers, purchasing agents and others responsible for reliable, efficient, low cost power transmission and control are invited to write for a free copy.



Pullmore Clutches are made in single and double types, in capacities up to 75 h.p.

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July, 1937

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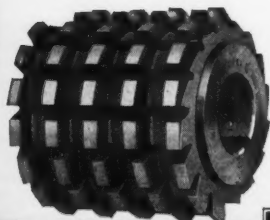
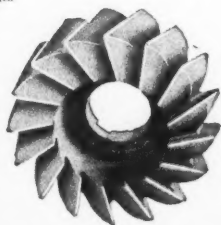
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Modern manufacturing practices have created new standards for both Precision and Production.

Gauge tolerances of only a few years ago, have become today's mass production tolerances.

At the same time, sturdier and higher powered machine tools have made new and increased demands on Metal Cutting Tools.

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on the bench by two bolts. The No. EH3 Lathe is one of the largest of its kind available. Bars of stock 12 inch in diameter can be inserted through the headstock spindle. The unusual large swing over the bed permits the use of large diameter jaw chucks and face plates. The bed is 36 in. long with a maximum center distance of 17½ in. The swing over the bed is 8¾ in. The stock spindle travel, 3½ in.; compound rest top slide travel, 5½ in.; compound rest bottom slide travel, 3¾ in. The compound rest swivels 50 deg. either side of center. The net weight of the lathe with regular equipment is 120 lbs. and the net weight of the Transitorq drive unit is 85 pounds.

Regular equipment includes the bed with hold-down bolt, nut and washers; enclosed headstock with preloaded bearing spindle and double V-belt drawback spindle and handwheel; center collet; 4½ in. dog drive plate and center, and tailstock and center. The Transitorq drive unit includes a ½ h.p. A.C. or D.C. motor, switch and manual speed control, wired and connected for ready use.

DeVilbiss Air Compressing Outfit

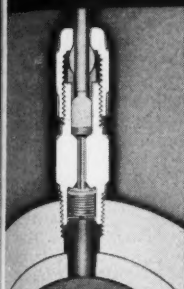
Four air compressing outfits, supplied in 7½ or 10 h.p. with single or two stage compressors available with either horsepower, have been placed on the market by The DeVilbiss Company, 30 Phillips Ave., Toledo, Ohio. These compressors are designed especially for large automotive service stations and auto finishing establishments, whose compressed air requirements are unusually heavy, and for small industrial plants whose compressed air needs are beyond the capacity of the ordinary air-cooled compressor but not equal to the capacity of the industrial type water-cooled air compressing outfit.

Two compressors, each of which develops a maximum pressure of 200 lbs. with the two-stage compressors or 150 lbs. with the single-stage unit, are firmly mounted on opposite ends of the 24 60-in. air tank. The motor which drives both compressors is set between them on the air tank.

Each compressor has a V-belt drive combination air strainer and muffler, check valve, inter and after cooler, and centrifugal pressure release mechanism set to cut in at 160 lbs. and cut out at 200 lbs. on the two-stage, and in at 80 lbs. and out at 100 lbs. on the single-stage compressor. Displacement of the

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The correct
oil film
to each
individual
bearing...
automatically



BIJUR

AUTOMATICALLY *Correct* LUBRICATION

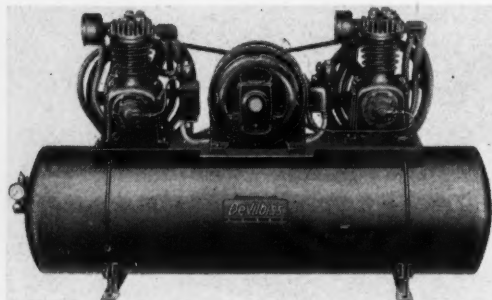
● Far-sighted manufacturers . . . such as INTERNATIONAL BUSINESS MACHINES CORPORATION . . . are quick to sense the advantages of automatic lubrication. On the International machine, the Bijur Lubricator serves 90 bearings . . . helps to keep the machine at full operating efficiency. Again—in their production departments—they find it advantageous to use machines on which Bijur Lubricators are standard equipment. Write for Bijur Bulletin "D."

BIJUR LUBRICATING CORPORATION

LONG ISLAND CITY, NEW YORK

outfits varies from 31½ to 57 cu. ft. of free air per minute, depending upon pressure and horsepower.

The air tank capacity of both the 7½ and 10 h.p. outfits is 10.88 cu. ft.,



DeVilbiss Air Compressing Outfit

although a 20x72-in. tank with an air capacity of 13.06 cu. ft. can be supplied if desired. Standard equipment on all outfits includes pressure gage, outlet, drain and safety valves, and automatic starting device.

Red Stripe Compound Angle Magnetic Chuck

The Grinding Machinery Co., 2832 Grand Blvd., Detroit, Mich., has announced a compound angle magnetic chuck for use in the grinding of tungsten carbide tools, crankshaft tools, lathe tools, thread chasers, and so on. The chuck is made in two sizes indicated as the Senior and Junior models. The Senior Model is 4½x6 in. with V-block and vise attachments to fit the same base. The V-block is 4x4x3 in., and is hardened and ground all over.

The Junior Model is 3½x4 in., with V-block and vise to fit the same base. The V-block dimensions being 3x2½x2½ in. This block is also hardened and ground all over.

A portable rectifier which operates on 110 volt D.C. current is furnished for both chucks if needed. Portable rectifiers are now available for use in plants where it is necessary to transfer the magnetic chuck from one location to another in the plant where it

If You're Looking For

COUNTERBORES

That Really
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COSTS!



Screw and bolt heads never fail to seat properly, regardless of irregularities in their shape or size, when **PUTNAM FAST-SPIRAL SOLID COUNTERBORES** are used! The counterbore diameters of both the cutter and pilot for body size holes are 1/32" over listed sizes—a trouble-saving feature that is exclusive with **PUTNAM**. Flutes are three times longer than those ordinarily used, and the chip clearance is greater in proportion to the diameter. They are designed and constructed for the maximum efficient, long-wearing cutting life—and to show definite savings in **YOUR** production costs!

Our Catalog No. 3 lists the complete line of Putnam Tools.

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PUTNAM TOOL CO.
2981 CHARLEVOIX AVE. DETROIT, MICH.

END MILLS
•
SPECIAL
TOOLS



Angle **FASTER, SAFER ALLOY CUTTING**



THROUGH use of abrasive wheels *speed-bonded* with Bakelite Resinoid, makers of special tool-steel alloys increase production in cut-off operations, with consistent safety to workers and fewer shut-downs for

wheel-dressing. Strong, heat-resistant, cool-running...Bakelite Resinoid bonded wheels operate safely and efficiently up to 16,000 s.f.p.m. Write for informative booklet 47G, "High Speed Abrasive Wheels".

BAKELITE CORPORATION, 247 PARK AVENUE, NEW YORK, N.Y.
BAKELITE CORPORATION OF CANADA, LTD., 163 Dufferin Street, Toronto, Ont.

BAKELITE

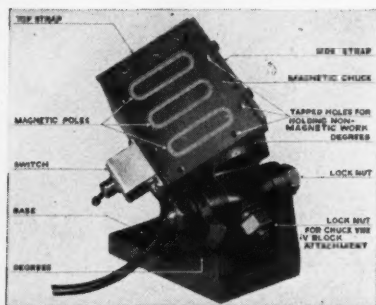


BONDED WHEELS

FOR ECONOMICAL HIGH SPEED GRINDING

rect current is not available.

The Electro-Rectifier uses standard radio tubes and furnishes an economical means of obtaining direct current from



Red Stripe Compound Angle Magnetic Chuck

standard 115 volt, 50 or 60 cycle lines. The rectifier comes complete with a suitable cord and outlet plug. A female Hubble cap is also provided so that the chuck may be plugged directly into the direct current output of this rectifier. An on-and-off switch is mounted on the front panel of the rugged metal housing containing the transformer and

rectifying tubes. A pilot light is provided to notify the operator that the tube fatigue has accrued and the chuck is no longer magnetized.

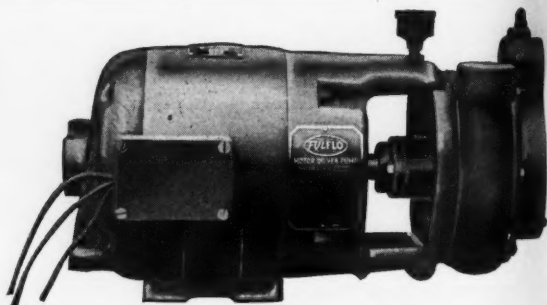
The use of standard radio tubes makes possible economical replacements immediately in the most remote communities. These tubes have an expected life of 1000 hours when used in this rectifier. The engineering department of this company is available for information regarding the best type of rectifier to use with a specific chuck and where necessary will design special installations to meet special needs.

Covel No. 72-A Swivel Head Surface Grinder

Covel Manufacturing Company, Benton Harbor, Mich., has developed a swivel table intended for use in the grinding of all kinds of milling cutters including spirals, counterbores, special tools and irregular surfaces. The large grinding wheel is mounted on a heavy spindle driven by a $1\frac{1}{2}$ h.p., 1750 r.p.m. motor. Power is transmitted by means of a V-belt and three speeds are available. The spindle runs in ball bearings which are designed to prevent end play.



- QUIETNESS
- RELIABILITY
- MAXIMUM PERFORMANCE



CENTRIFUGAL COOLANT PUMPS

THESE UNITS CAN BE MOUNTED IN ANY POSITION

AG3M.....	1/4 H.P. BALL BEARING MOTOR.....	25 G.P.M.....	10 FT. HEAD
AG4M.....	1/3 H.P. BALL BEARING MOTOR.....	35 G.P.M.....	10 FT. HEAD
AG5M.....	1/2 H.P. BALL BEARING MOTOR.....	50 G.P.M.....	10 FT. HEAD
AG6M.....	3/4 H.P. BALL BEARING MOTOR.....	70 G.P.M.....	10 FT. HEAD

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BLANCHESTER, OHIO

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ASK FOR BULLETIN No. 36A

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ALL TYPES

HARDINGE
COLLETS SINCE 1890
DRAW-IN COLLETS
FOR ALL
LATHES AND MILLERS

FOR
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—DURABILITY—
—ATTRACTIVE PRICES—
"SPECIFY HARDINGE COLLETS"

PROMPT DELIVERY FROM STOCK

Refer To Inside Pages For Your Requirements
Purchasing and Engineering Departments. Keep This List for Reference Purposes

Hardinge Collets are in stock for immediate delivery. Hardinge Collets embody those elements of precision which have characterized our products since 1890.

HARDINGE BROTHERS, INC., ELMIRA, NEW YORK

THE ABOVE COLLET DATA BULLETIN IS AVAILABLE FOR
PRODUCTION, PURCHASING, STOCKROOM AND ENGINEERING
DEPARTMENTS

Reasons Why Each Department Should Have a Copy:

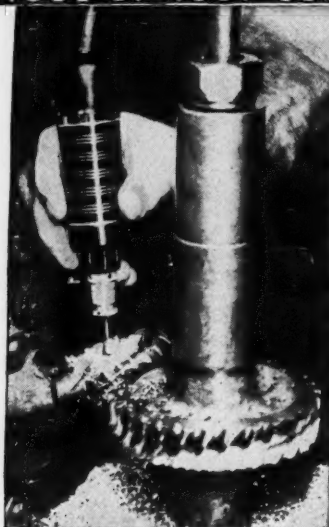
1. Clearly shows the styles of collets adapted in your lathes and millers.
2. Lists the standard collets with general dimensions for identification.
3. Gives normal round, hexagon and square capacity of standard collets.
4. Shows how all of your lathes and millers may be adapted for collets.
5. Collet stocks in Elmira, Chicago, Detroit, New York and Los Angeles.
6. Attractive prices are listed for round, hexagon and square hole sizes.

HARDINGE BROTHERS, INC., . . . ELMIRA, N. Y.

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TOOL OF 1001 USES



GRINDS, DRILLS, CARVES POLISHES, ENGRAVES, SAWS

HERE'S the wonder tool that is effecting such revolutionary savings in many laboratories, model and tool rooms and on production lines. Hard-to-get-at places on machines can now be repaired without removing the part or dismantling machine. The Handee uses 200 different accessories, instantly interchangeable, for work on all metals, alloys, bakelite, celluloid, wood, glass, resins and other hard substances. Finest, speediest, most powerful tool for its type. 25,000 r.p.m. AC or DC, 110 volts. Weighs only 12 ounces. No shop or factory can afford to be without the Handee. Try one.

**Order Today on 10
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for Catalog.**

De Luxe Model
Postpaid
6 Accessories Free
\$18.50

CHICAGO WHEEL & MFG. CO.
1101 W. Monroe St., Dept. 00, Chicago, Illinois

M. M. S. 7

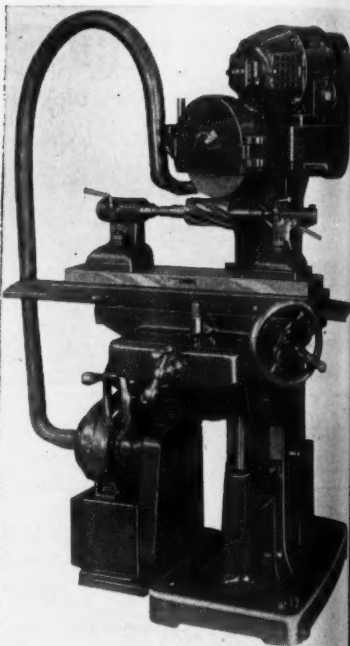
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Name

Address

The head swivels 30 deg. in either direction and the motor is mounted on vibration-absorbing base which swivels with the head.

Centers of fixtures can be mounted on the swivel table. The table is graduated at one end in degrees and at the other in inches-per-foot taper. Rests for indexing can be fastened to the head or table. All adjustments are accurate and convenient to the operator. The longitudinal travel of the



Covell No. 72-A Swivel Head Surface Grinding Machine

table is through a spiral gear (mounted on a ball and roller bearing) and rack. This adjustment is smooth and fast, and is always under full control of the operator.

The size of the standard grinding wheel is 10-in. diameter by $\frac{3}{4}$ in. thick by $2\frac{1}{2}$ -in. hole. Wheels up to $2\frac{1}{4}$ in. thick can be supplied. The main spindle speeds are 1900 r.p.m., 2400 r.p.m. and 2900 r.p.m. Longitudinal travel of table, 18 in. Vertical movement of table, 11 in. Transverse movement of table, $7\frac{1}{2}$ in. Working surface of swivel

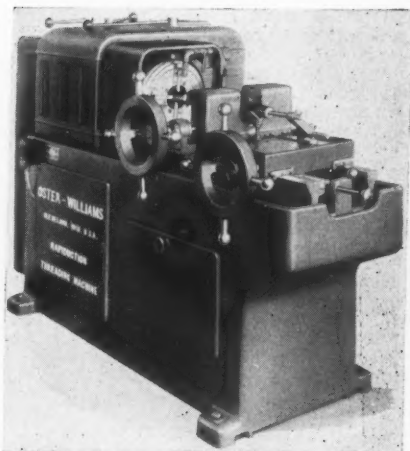
either direction. Table swivels 45 deg. in either direction.

Centers will swing work 12 1/8-in. diameter by 14 1/2 in. long. Distance from center of grinding wheel to table, maximum 17 1/2 in., minimum 6 1/2 in. Height from center of spindle to floor, 49 1/4 inches.

Floor space required, 5x4 ft. Weight with motor, without dust collecting attachment, crated, 1330 pounds.

Oster No. 915 Single Spindle "Rapiduction" Bolt Threading Machine

The Oster Manufacturing Company, Cleveland, Ohio, has announced the development of an improved No. 915 Single Spindle "Rapiduction" Bolt Threading Machine. The machine is built for high production on standard runs in bolt plants and for increased production on an extremely wide variety of special work, a necessary part of the manufacturer's product. Its regular bolt range covers all sizes from 3/8-in. to 1 1/2-in. at spindle speeds ranging from 49 to 298 r.p.m. A spindle bore of 2 1/4-in. and a vise adaptable to many different types of work holders, gives the



Oster No. 915 Single Spindle "Rapiduction" Bolt Threading Machine

No. 915 unlimited possibilities for work of a special nature.

The machine is of modern design. Timken bearings are used throughout



FURNAS STANDARD DRUM SWITCHES

For Reversing and Two Speed Motors

Compact and rugged, extensively used wherever motors are to be reversed, or speed is to be changed. These controllers can be readily adapted to a variety of special switching combinations. We invite inquiries for special controllers.

Write for catalog giving details of fifty different styles.

FURNAS ELECTRIC CO.
815 S. 72nd St. West Allis, Wis.

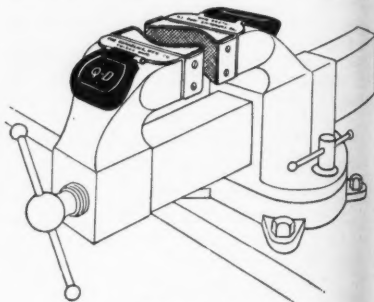
and the diehead is made of the finest hardened and ground tool steel. All the dies are of high speed steel. The spindle is made of high carbon steel forgings, heat treated and ground, and is mounted on pre-loaded tapered roller bearings that are adjustable for long wear. Driving and change speed gears are chrome nickel steel, heat-treated and ground, and run in oil.

The headstock shaft is also made from high carbon steel, heat-treated and ground, and is mounted in tapered bearings, automatically lubricated and adjustable for wear. Semi-steel makes up the vise-carriage. The carriage is rigidly supported with both lateral and vertical adjustments for wear. Guards cover all moving parts of the machine that might cause injury.

Q-D Vise Jaws

The manner in which Q-D Vise Jaws can be applied to the ordinary type of bench vise is shown in the illustration. These jaws, designed for holding work without marring or work of irregular contour, have been placed on the market by The Cornelius Manufacturing Co., 1678 Dorr St., Toledo, Ohio. The

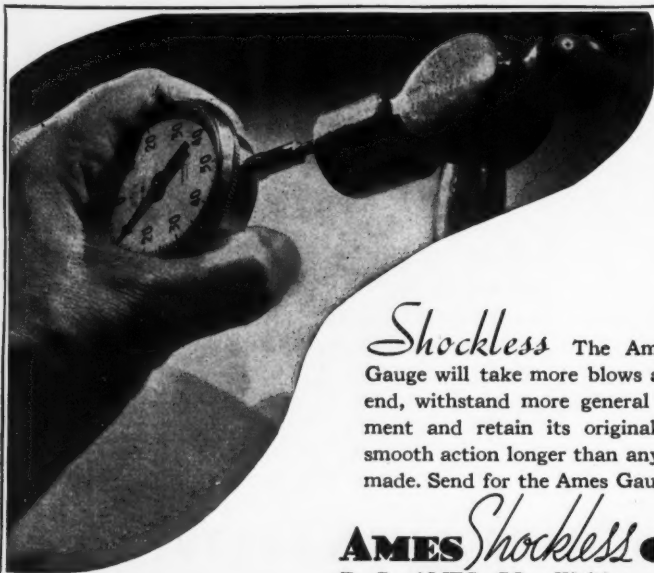
jaws are easily attached to any vise, large or small, simply by placing the jaws in position and allowing the counter weights to rest on the top slope of the vise body. Each jaw is equipped



Q-D Vise Jaws

with "hook on" buttons to which can quickly and easily be attached a variety of jaws designed for the work in hand.

For instance, one set of jaws may be made of rubber or padding for holding pistons, Moto-meters, hub caps, armatures, and similar work which must not be marred or damaged by holding be-



Shockless The Ames Shockless Gauge will take more blows at the spindle end, withstand more general rough treatment and retain its original setting and smooth action longer than any other gauge made. Send for the Ames Gauge catalogue.

AMES *Shockless* **GAUGES**
B. C. AMES CO., Waltham, Massachusetts

ny vis-
ing the
e coun-
slope of
quipped



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variety
hand,
may be
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arma-
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Electric power for welding with this Lincoln Arc Welder costs as little as 5c per hour. You can weld 2 to 3 times faster than by any other welding process. Many machine shops are actually saving from 50% to 75% on their welding costs by the use of this Lincoln Arc Welder. The Lincoln "Junior" Arc Welder is especially designed for use in machine shops. It is fast, easy to operate and it is as reliable as your other electric equipment or your electric lights. With it you can weld steel, sheet metal, cast iron, aluminum or alloys—anything from small light-gauge parts to machine bases and large shafts. Saving so much money, day after day, these welders pay for themselves in a few months' time. Mail the coupon today for details.

THE LINCOLN ELECTRIC COMPANY

Largest Manufacturers of Arc Welding Equipment in the World

THE LINCOLN ELECTRIC COMPANY
Dept. E-407, Cleveland, Ohio

Send details about the SA-75, SA-100 and SA-150.

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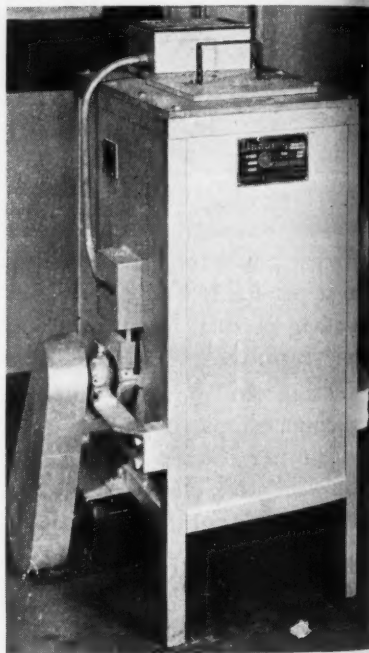
UNIVERSAL ENGINEERING CO.
FRANKENMUTH, MICH.



tween steel jaws. Another set of jaws can be made up with a variety of slots running in both vertical and horizontal directions for holding round or square rods, plated pipe sections or plumbing fixtures, and so on.

Lindberg Laboratory "Cyclone" Furnace

Lindberg Engineering Company, 221 N. Laflin St. Chicago, Ill., is now building a small, inexpensive laboratory furnace designed on the same principle as the



Lindberg Laboratory "Cyclone" Furnace

production type Cyclone furnace which is also made by this company. This furnace is intended to meet the demand for low temperature units for drawing and similar operations.

The Lindberg Laboratory Cyclone Furnace has a work chamber 8 in. wide by 10 in. deep, for which is provided a plug type cover that can easily be lifted off for inserting the load. The electric heating elements are mounted in a separate chamber, thereby eliminating all



LUFKIN INSIDE MICROMETER IS ACCURATE, EASY TO READ, EASY TO 'FEEL'

You'll get day-after-day satisfaction from the ingenious LUFKIN inside micrometer. It's just right in weight—you can get the "feel" most sensitively. It's just right in legibility—it's easy to read accurately. It's just right for any kind of inside measuring job—its precision never varies. Equipped with light weight tubular steel extensions, the LUFKIN inside micrometer retains its stiffness and accuracy even when built out to extreme lengths.

Ask your supply dealer to show you this and other outstanding LUFKIN Precision Tools.

Write for Catalog No. 7

LUFKIN

PRECISION TOOLS TAPES — RULES

SAGINAW, MICHIGAN • NEW YORK CITY

*You Can't Beat
the Original Deckel G.K.
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for Plastic Mould and Die Production*

*Plastic
Dies Moulds
Steel
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Engraving
Profiling
on flat, convex
concave and
cylindrical
surfaces*

*Write for G.K. Booklet
HPPREIS ENGRAVING MACHINE CO.
155-157 Summit St. Newark, N.J.*

direct radiation to the charge. A powerful blower fan circulates the heated air through the work chamber, insuring rapid, uniform heating.

The furnace is sturdily constructed of heavy steel plates reinforced with structural angles which extend to the floor, forming the base and supporting the furnace at convenient working height. Efficient slab insulation reduces heat loss to the minimum throughout the temperature range up to 1250 deg. F. The furnace serves as an accurate and inexpensive pilot furnace for checking up on production or for predetermining the response to specified heat treatments, as well as for tempering small tools and individual steel parts.

Kirk & Blum Pickling Baskets and Crates

Pickling baskets and crates made of the metal to suit individual requirements are being manufactured by The Kirk & Blum Mfg. Co., 2816 Spring Grove Ave., Cincinnati, Ohio. As the result of their accumulated experience, Kirk & Blum engineers are prepared to promptly meet requirements for any

FOR ROUGH TREATMENT

● When you buy a Dial Indicator, you make sure that it will be able to take rough treatment and still register accurately. That's smart buying.

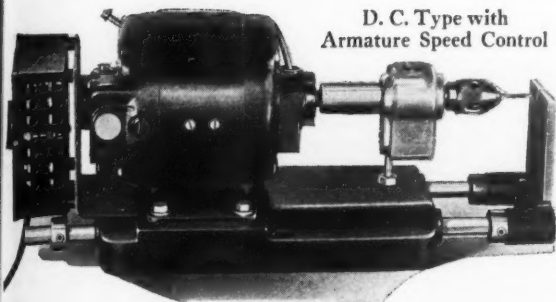
Standard's new SHOCKPROOF construction protects the delicate mechanism from shocks that would destroy the precision of the average dial indicator. STANDARD Dial Indicators can "take it".

Write for new catalog

For Better Gaging come to "Standard"

STANDARD GAGE CO., INC.
POUGHKEEPSIE, NEW YORK



D. C. Type with
Armature Speed Control

Flexible and rapid, the compact Wahlstrom Bench Type Portable Tapper is a big time and labor saver in many plants; capacity 2/56 to 1/4 inch; the direct current model. Note the apron mounted on sturdy, adjustable supports which can instantly be regulated for a wide range of work. Breakage of small size taps is greatly reduced.

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made of
require-
by The
Spring
As the
perience
pared to
or any

The Wahlstrom Bench Type Portable Tappers

VERTICAL as well as horizontal tapping can be done with the Wahlstrom Bench Type Portable Tapper. Its distinctive design is NOT of the friction type of construction; therefore it is equally adaptable to tapping at any vertical position or angle—a great advantage where production embraces variable sizes and shapes of work. The Wahlstrom Tapper is full automatic, operating always on the forward motion when contacting the work; yet it will instantly reverse (automatically) at the slightest backward pull of the apron or the work being tapped.

Its range in materials is from Steel to Moulded Plastics, or more delicate materials, without injury to the threads when reversing.

Equipped with 1/6 H. P. Motor, 1140 r.p.m., with provision for cutting down speed 50% when using maximum size taps.

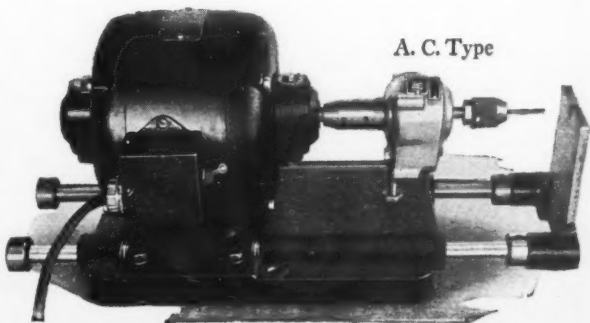
When ordering tappers or requesting information, kindly mention the kind of materials on which the tools are to be used so that you can receive a properly adjusted tapper.



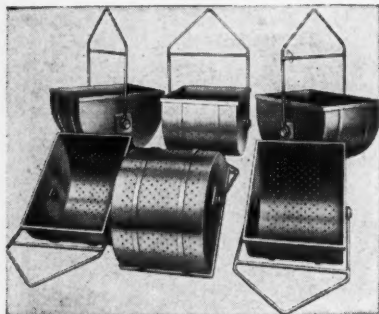
Wahlstrom Tool Division
American Machine & Foundry Co.
5502-5524 Second Avenue, Brooklyn, N. Y.

Portable, easily moved from place to place—saving time and additional handling on small work; capacity 2/56 to 1/4 inch; alternating current model illustrated; a splendid unit to prevent congestion around permanently located tappers. Production executives should write for an illustrated folder on the only fully automatic tapper with the unique advantages of Wahlstrom construction design.

A. C. Type



type and size of perforated buckets and baskets, crates, tubs, racks, and lead or rubber-lined steel tanks. Kirk & Blum modern manufacturing methods and



Kirk & Blum Special Aluminum Bronze Alloy Pickling Baskets.

skilled metal craftsmen are said to assure sturdy and durable products.

In determining the right alloy and the correct design for a particular pickling problem, the Kirk & Blum engineering department will lend its assistance.

Carboloy Announces New Standard Blanks at Reduced Prices

Carboloy Company, Inc., 2975 E. Jefferson Ave., Detroit, Mich., announces the development of 3 styles of standard Carboloy blanks available at reduced prices. The 3 styles in 96 sizes have been designed for wide application, based upon experience with thousands of carbide tool applications. They are adaptable for use on more than 90% of all carbide tools in use today. In many cases, simple revisions in tool design will enable users to use these standard blanks at a substantial saving in carbide cost. These savings will apply to standard blanks used by manufacturers in making their own tools, or used in Carboloy "Milled and Brazed", or "Finished" tools.

A number of definite advantages are offered to those using Carboloy Standard Blanks: (1) Savings of 15% and up on the price of Carboloy in any grade. (2) Large-quantity prices on small quantity orders. (3) Immediate deliveries. (4) Reduction in designing time and blank cost by using blanks shaped to proven tip proportions, and (5) Wide adaptability offers users a chance to

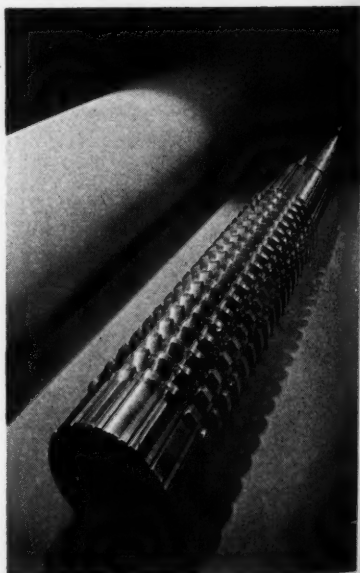


BETTER Broaches for every job and the only broaches for some jobs.

**MORE parts per grind
MORE grinds per broach
25% to 35% Longer life.**

Write for NEW bulletin today.

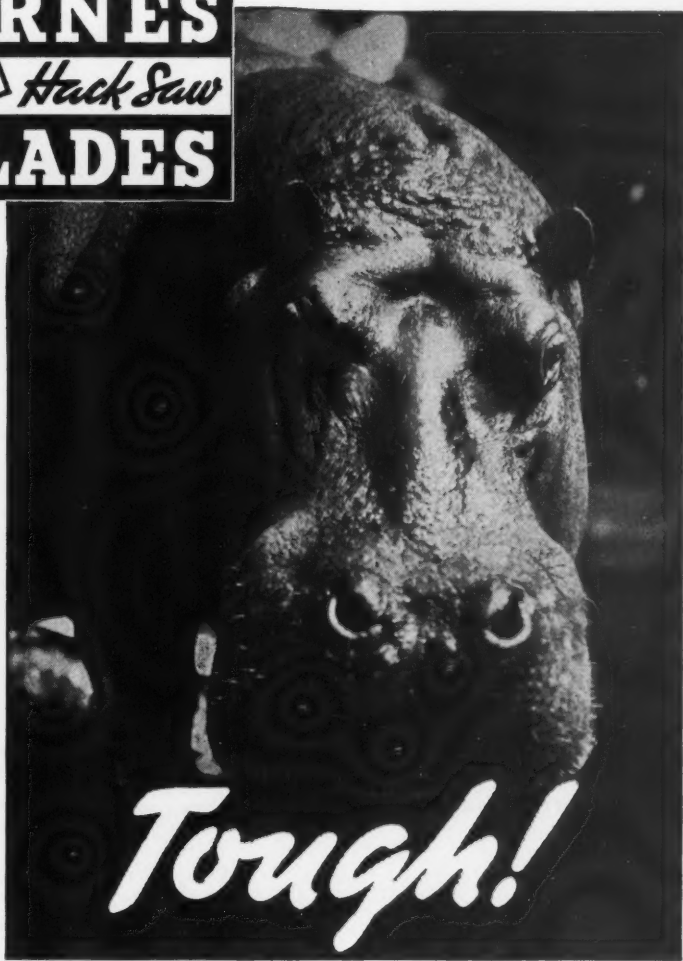
The Connecticut Broach & Machine Co.
New London, Conn.



BARNES

BETTER *Hack Saw*

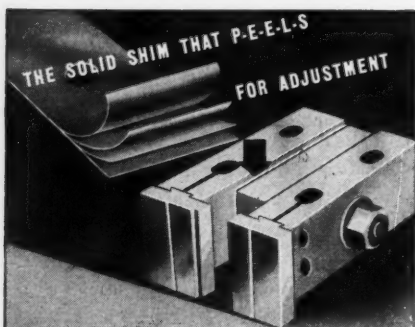
BLADES



Barnes "Service" Blades—carefully made from special alloy steel—are tough. They have what it takes to meet the requirements of modern high speed production.

Every Barnes Blade is a good blade. There's a different type for every type of cutting service. Consult your supply dealer.

W. O. Barnes Co., Inc., Detroit, Michigan



Spacing cutting-tools

PRECISION ADJUSTMENT of cutting-tools by simply **P-E-E-L-I-N-G** the paper-thin laminations002" or more at a time! No filing . . . no grinding . . . no machining.

Setups can be made up from standard tool holders without costly machining and fitting. A real money-saver. Tool holders remain standard for retooling. Write for a sample of **LAMINUM**.

Order through your Mill Supply House

Also a complete line of brass and steel thin shim stock, and arbor spacers.

LAMINATED SHIM COMPANY, INC.
Mfrs. . . . Long Island City, New York

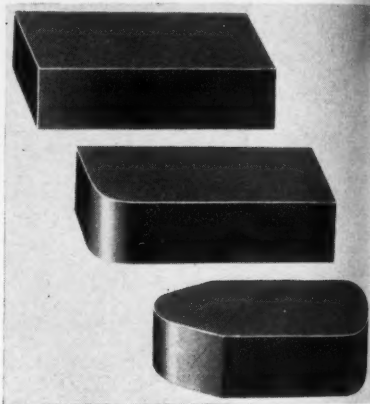
699

LAMINUM
Precision adjustment SHIMS

group purchases on larger quantities.

In addition to the special price reduction on Carboloy Standard Blanks in any quantity, a special reduction has also been made on special blanks in quantities of 500 or over. Special blanks are all blanks other than the 3 standard styles.

The Carboloy Company wishes to emphasize that these are not general price reductions but instead, special reductions made possible through the quantity production. The base price of Car-



Carboloy Standard Blanks

boloy remains at 45c per gram.

A full explanation, together with the new, low standard blank prices, description of standard tools, and full scale drawings of the 96 standard blanks in 3 styles, is contained in a new 28-page catalog—M-37—available upon request.

Geneva Precision Dial Indicator

The instrument shown in the illustration is the Geneva Precision Dial Indicator which is now being marketed by Chicago Dial Indicator Co., 180 N. Wacker Drive, Chicago, Ill. The outstanding feature of this instrument is the precision which is obtained with the minimum of parts, a lever arm being used in place of the usual multiple gearing. The lever arm performs the functions which would otherwise require a gear $1\frac{1}{2}$ in. in diameter, thus construction involving necessity of only one pivot point between the driver and the driven. Readings are thus obtained in the most direct manner, reducing possibility of error to the minimum.

THESE Lathe and Grinder CENTERS

**Last 50 Times Longer
Than Ordinary Centers**

Increase the life of your lathe and grinder centers! Get greater accuracy on your work! Eliminate all burning and scoring! Use centers tipped with Carboloy cemented carbide!



Unlike steel centers, Carboloy cemented carbide approaches the diamond in hardness and has an unusually high resistance to abrasive wear. It is ideally suited to resist the extreme wear on lathe and grinder centers, particularly where the work is nitrided, case hardened, or heat treated shafts.

A large eastern manufacturer writes:

"We have used about 200 Carboloy tipped centers. . . . On continuous production we grind Carboloy centers about once every 4 months. Even then, only a light finish grind is necessary. On one job, Carboloy centers lasted 3 years with one grind, whereas steel centers stood up for one week only!"

Try Carboloy-tipped centers on your lathes and grinders.

**Greater
Accuracy!**

No Burning!

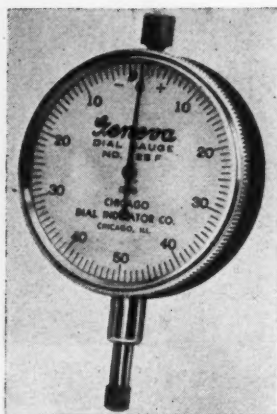
No Scoring!

*Write for
Leaflet*

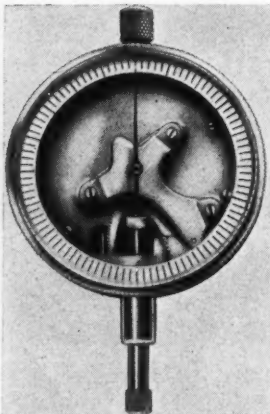
CARBOLOY COMPANY, INC.

2975 East Jefferson, Detroit

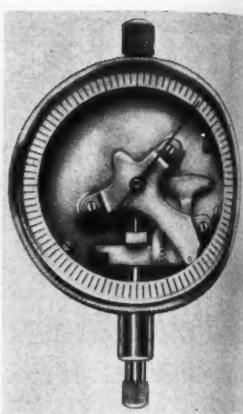
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Geneva Precision Dial Indicator
No. 125F with Dial 0-50-0 In-
dicating 0.001 Inch

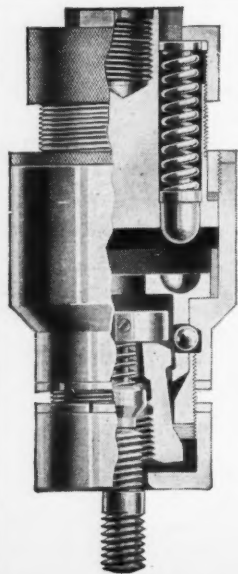


Interior of Geneva Indicator showing lever arm
at start and end of travel.



The case and plunger housing are machined from a one-piece nickel silver casting. The movement is mounted between separate top and bottom plates. The hair spring is mounted between two

flat plates and cannot interfere with the lever rack. Stainless steel and bronze alloy parts are used throughout to make the instrument rust-proof. Special bearings provide for long wear and



TITAN STUD SETTER CONTROLLED DRIVE Assures Perfect Setting

The Titan Stud Setter has a safety clutch which controls driving power.

The Titan is positive in driving and automatic in releasing, thus making it possible to set the studs to any predetermined degree of tightness.

When the studs are driven to the specified tightness, the drive is automatically released and the tool may be removed without fear of mutilating or distorting the threads.

The great capacity, speed range, utility, and safety of this production tool make the Titan Stud Setter a profit-earning tool wherever it is used.

Write today for the new illustrated circular.

TITAN TOOL COMPANY

FAIRVIEW

PENNA.

Calling all flat wire specs in the "REAL TOUGH" class

WE make cold-rolled steel flat wire... high and low carbon ...for a host of "hard-to-please" users of this product.

All of these users have exacting requirements. Some demand great toughness and resiliency... others uniform temper, held within very close limits. Exceptional dimensional accuracy, freedom from defects on surface and edges, ability to withstand severe drawing strains... are

a few of the other specifications we are constantly called on to satisfy.

Are your flat wire specs in the "real tough" class? If so, you are sure to be interested in our services and products. For over 40 years we have specialized in this type of business and have special facilities to handle it.

We invite your inquiry for further data, prices or samples.

Types:—Roebling Cold Rolled Flat Wire is made from both high carbon and low carbon steels, produced in Roebling's own mills.

The high carbon flat wire is available in tempered and untempered types.

Finishes:—bright, black annealed, bright annealed, tinned, galvanized, blued, straw-colored, coppered.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, N. J. *Branches in Principal Cities*

Roebling COLD ROLLED STEEL FLAT WIRE



John A. Roebling's Sons Co.
(Mail to Trenton, New Jersey or nearest office)

- ☐ Please mail me copy of your Flat Wire Catalog
☐ Have your representative call.

Name

Company

Street

City and State



a minimum of friction. The plunger, which is hardened and ground, has a nickel silver bearing. The instrument is provided with a rotating adjustable dial with positive lock nut. The top knurled nut operates an internal lock for the dial, thus permitting fine settings. The case is of dust-proof design; removal of the back does not leave the parts open to dust and dirt.

The dial is of metal, lithographed for clear, easy reading, black lettering being used on a silver background. The crystal is non-breakable. The instrument is 2 in. in diameter and 7/16 in. thick, not including the curvature of the crystal. The stem is 0.275 in. outside diameter and provides a 5/8 in. long bearing for the plunger. The plunger is 5/32-in. diameter with 3/16-in. travel.

Clark Scrap Truck

A recent addition to the line of material handling equipment made by All Steel Welded Truck Corporation, 1123 Railroad Ave., Rockford, Ill., is the scrap truck illustrated herewith. The truck is 46 in. long at the top, 27½ in. long at the bottom, and 18½ in. deep. It is made from 10 gauge sheet metal constructed on a frame of steel angles and



Clark Scrap Truck

having a handle of 1-in. pipe. The truck is electrically welded throughout and designed for correct balance. The truck is practically indestructible, leak-proof, and easy to handle.

Standard equipment includes two 9-in. diameter semi-steel wheels with Hyatt type roller bearings, Zerk fittings, and one double-row ball bearing caster with 6-in. semi-steel wheel and Hyatt type roller bearing and Zerk fitting.



HIGH SPEED—PRECISION
**TAPPING
ATTACHMENTS**
FOR YOUR DRILL PRESS WITH
THE NEW
**"TRU-GRIP"
TAP HOLDER**

Ball Bearings, Double-cone, long-life Friction Clutch, Balanced Reversing Mechanism. Precision made. Built for Accuracy, Production, Service and Value.

Full Details Gladly Supplied—Send For Latest Literature.

PROCONIER SAFETY CHUCK CO.
12 SO. CLINTON ST. CHICAGO, ILL.

SILENT FORMICA GEARS



FORMICA gears are popular because they make quiet machines possible. That helps machinery salesmen and helps even more the maintenance man who is expected to keep machinery running smoothly and sweetly. When they are properly cut in the right sizes Formica gears will outwear metal. They interpose elastic members in the drive to absorb shocks and save the machines. Any of the gear cutters named can provide Formica gears for maintenance or production purposes.

THE FORMICA INSULATION COMPANY

632 Spring Grove Avenue

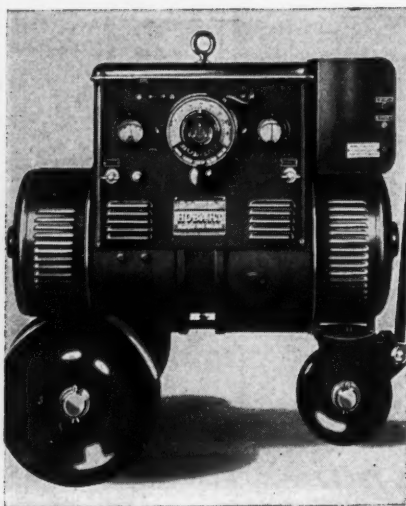
Cincinnati, O.

FORMICA

FORMICA GEAR CUTTERS

- The Akron Gear & En'g Co.
Akron, Ohio
- Farrell-Birmingham Co.
Inc., Buffalo, N. Y.
- Slaysman & Company
Baltimore, Md.
- The Union Gear & Mch. Co.
Boston, Mass.
- Chicago Rawhide Mfg. Co.
Chicago, Ill.
- Perfection Gear Company
Chicago, Ill.
- Gear Specialties, Inc.
Chicago, Ill.
- Merkle-Korff Gear Co.
Chicago, Ill.
- Chicago Gear Works
Chicago, Ill.
- Footle Gear Works
Cicero, Ill.
- The Cincinnati Gear Co.
Cincinnati, O.
- Clarksville Foundry &
Machine Co.
Clarksville, Tenn.
- The Horsburgh & Scott Co.
Cleveland, O.
- The Stahl Gear & Machine
Co.
Cleveland, O.
- The Master Electric Co.
Dayton, O.
- The Adams Company
Dubuque, Ia.
- Hartford Special Mchny. Co.
Hartford, Conn.
- Beatty Machine Works
Keokuk, Ia.
- The Generating Gear Co.
Milwaukee, Wis.
- Badger State Gear Co.
Milwaukee, Wis.
- Precision Machine Co.
Milwaukee, Wis.
- E. A. Pynch Co.
Minneapolis, Minn.
- Joaquin Alomany Lopez
Havana, Cuba
- New Jersey Gear & Mfg. Co.
Newark, N. J.
- Prager, Inc.
New Orleans, La.
- J. Morrison Gilmour
New York City
- Sier-Bath, Inc.
New York City, N. Y.
- Mid-State Electrical Eng'r.
Co., Osceola Mills, Pa.
- E. M. Smith Machine Co.
Peoria, Ill.
- The Eagle Gear & Mch. Co.
Philadelphia, Pa.
- Rodney Davis and Sons
Philadelphia, Pa.
- The Pittsburgh Machine &
Supply Co., Pittsburgh, Pa.
- Perkins Machine & Gear Co.
Springfield, Mass.
- Winfield H. Smith, Inc.
Springville, N. Y.
- Ailing Lander Company
Sodus, N. Y.
- Charles E. Crofoot Gear
Corp., S. Easton, Mass.
- Arlington Machine Co.
St. Paul, Minn.
- Farwell Mfg. Co.
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- Massachusetts Gear & Tool
Co., Woburn, Mass.

Cut Pattern, Jig, Tool and Die Costs in two with the NEW SIMPLIFIED ARC WELDING



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FREE—Valuable books on various phases of welding are available. Check the one you want below.

- ☐ Carbon Arc Welding and Cutting
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Tear out and mail to Hobart Brothers, One of the World's Largest Builders of Arc Welders, Box ME-77, Troy, Ohio.

optional equipment, however, the truck may be equipped with a leg and lock pin assembly for the Clark Lift Jack in place of the caster wheels.

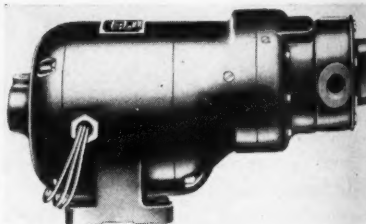
B & S Nos. 101, 102 and 103 Rotary Geared Motorpumps Redesigned

Brown & Sharpe Mfg. Co., Providence R. I., has changed the design and broadened the characteristics with which the B & S Nos. 101, 102 and 103 Rotary Geared Motorpumps can be equipped.

The pumps are now made to run in one direction only, either right hand or left hand, the direction being determined by the side of the pump on which the discharge is located when viewed from the motor end. With a right hand pump, the discharge will be on the right hand side and with a left hand pump, the discharge will be on the left hand side. The direction of the discharge is indicated by



B & S Rotary Geared
Motorpumps



an arrow on the cap of the pump. A mechanical seal is now used on these units in place of the packing used heretofore.

In addition to previous listings, these motor pumps are now available with three-phase motors, both in 220 and 440 volts, 60 cycle. Similarly, the No. 203 Centrifugal Motorpump is now regularly furnished with three-phase, 50 cycle, 220 volt motor, 1425 r.p.m. in addition to the present listings.

INTRODUCING...

*Greater lighting
efficiency with
the new*



HORIZONTAL COOPER HEWITT *Lamps*

22% more light per watt . . . instant starting . . . high power factor . . . plus the long, detail-revealing light source which more than a million workers and their employers now enjoy. They are all yours in the new Horizontal Cooper Hewitt Lamps.

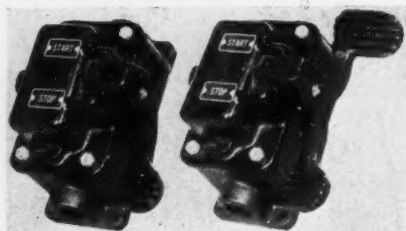
These "24-hour skylights" of low intrinsic brilliancy need no diffusing medium. The soft long-source light gets down into deep recesses, illuminates vertical surfaces and rests the eyes. All jobs are made easier—wherever sight is used.

Get the complete story of these new lamps. Let us explain why you can run many more of these light units per circuit with no increase in copper. Write for Bulletin 827DM. General Electric Vapor Lamp Company, 893 Adams Street, Hoboken, New Jersey.

**GENERAL  ELECTRIC
VAPOR LAMP COMPANY**

G. E. Treadle-Operated, Watertight Push-Button Station

For installations where an operator must have both hands free while starting or stopping his machine, General Electric Company, Schenectady, N. Y.,



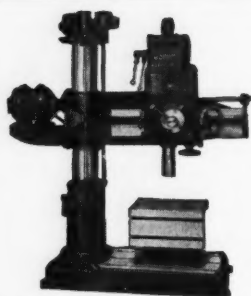
(Left)—G. E. Treadle-Operated, Watertight Single-Action Push-Button Station. (Right)—Double-Action Push-Button Station

has developed a new treadle-operated, watertight push-button station, to be known as the Type CR2940-2A18. The device is also especially suitable for use in damp or wet locations. The station is available either with a single-action or a double-action treadle.

The enclosing parts of the station case and cover, are made of cast iron and a cast iron foot pedal, or treadle is built into the cover. This pedal which operates a standard G. E. heavy-duty type push-button unit mounted inside of the case, is provided with stops to limit its travel in either direction. With this arrangement, the operator can push on the pedal as hard as he wishes without endangering the electrical parts of the device.

To eliminate moisture, a packing gland is fitted on the treadle shaft where the latter enters the case. This shaft is also provided with a spring which guarantees automatic return of the pedal to the neutral position, thus preventing the push-button unit from remaining depressed because of the weight of the pedal or friction in the packing gland. The blocks, or barriers in the push-button unit are made of molded material and are sprayed with a Glyptal paint to prevent their being affected by water.

Between the cover, which is held in place by four hexagonal head bolts, and the case is a vellumoid gasket. The case is arranged for conduit connections on either end and is so built that it can

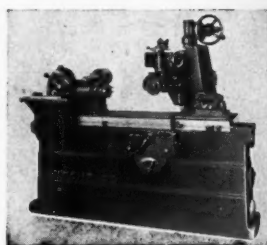


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FEATURE:

Rigidity — Convenience — Power —
Simplicity — Low Cost.
Don't fail to investigate the "MOR-SPEED" line of Radials. Full facts on request.

THE MORRIS MACHINE TOOL CO.
CINCINNATI OHIO



Let Us

GRIND YOUR SPINE SHAFTS

under contract with our new
Type B Spline Grinder.

FITCHBURG
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CORP.

FITCHBURG,

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E. heavy
mounted
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packing
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ASS.



STERLING

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facturing coupled with the expert knowledge of engineers trained to fit the wheel to the work.

Centerless Grinding Wheels
built by Sterling have gained an enviable reputation for efficiency in the Country's largest industries. A reputation earned by the application of closely supervised manu-

Our varied experience in making these efficient Centerless wheels is at your command and we respectfully suggest you call for one of our experts who will gladly check your grinding with you—no obligation.

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CHICAGO: 912 W. Washington Blvd. • DETROIT: 101-107 W. Warren Ave.

STERLING ABRASIVES

be mounted directly on the floor. The conduit connections will accommodate standard $\frac{3}{4}$ -in. pipe.

Model M and Model O Chronologs

Two new models of the Chronologs, product of The National Acme Company, 124 East 131st St., Cleveland, Ohio, have been announced by that company. The Chronolog is an instrument which provides mechanically a printed record of productive and non-productive time on any machine or operation. A record

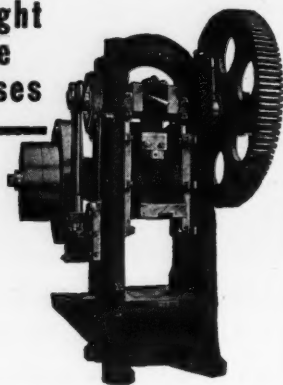
produced by the Chronolog also shows the causes and extent of idle time and a count of the units produced. The Chronolog record may be applied to provide such other production information as may be desired. The two new models now being announced are of simplified construction and operation. While these two models do not provide as much detailed information as the earlier models, they will provide all the data needed in most plants.

The Model M Chronolog may be applied to any machine, process or operation. When the operator begins work he starts the Chronolog, which records the exact minute of the start of the operation on a $4\frac{1}{2}$ -in. tape. The window at the upper right shows the clock time. The larger window at the left registers the number of units produced. At any interruption in the work the operator turns the knob at the left to a symbol indicating the reason for the interruption, this movement also registering the symbol on the Chronolog tape. Thus at the end of the day the operator pushes a button on the front of the Chronolog which records the starting time again on the tape.

Every ten minutes the Chronolog prints the count of units produced and the time. Visits of the foreman, inspector, stockman or others to the machine can be recorded on the Chronolog tape. When production is resumed, the printed record shows exactly how many minutes the machine was in operation, the number and extent of all interruptions, and the reason for these interruptions. With this definite knowledge before them, the department and managing executives can easily determine the reasons for interruptions of production and take steps to correct them.

The Chronolog can be used as a time clock at the machine if desired. It may be adjusted so that the digit wheels

Straight side Presses



—Outstanding in every detail for heavy blanking and forming work. All stresses are taken centrally.

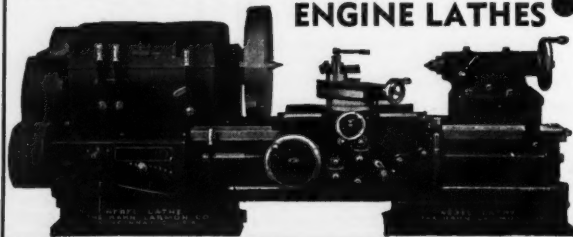
Write for new catalog illustrating and describing this and other presses.

Zeh & Hahnmann Co.

184 Vanderpool St.

Newark, N. J.

GEARED HEAD & CONE DRIVEN ENGINE LATHES



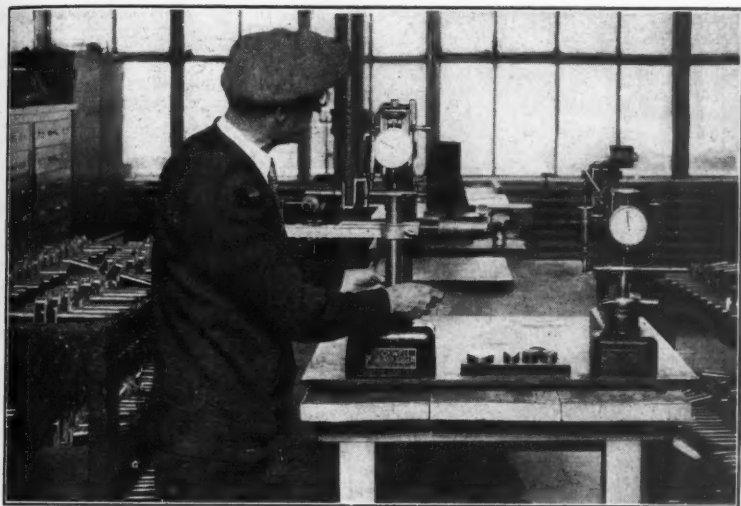
Sizes
16" to 36"
Swing

A full line of Gap Lathes,
16" to 50" swing.

Write for complete
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COMPANY
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"ROCKWELL" HARDNESS TESTER

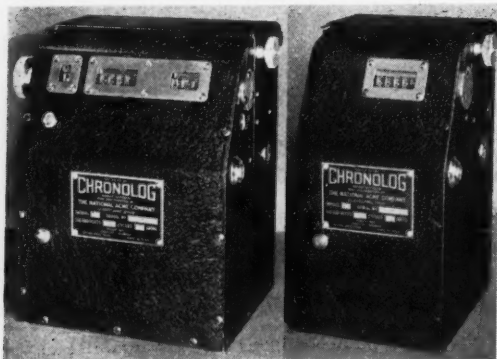


OUTBOARD Motor crankshafts, by supporting them on the Vari-Rest, are readily and rapidly tested on the "ROCKWELL".

The "ROCKWELL", because it is made with such great precision, is suited to research testing and because it is so convenient and rugged, it lends itself to quantity inspection testing.

WILSON
MECHANICAL INSTRUMENT CO. INC.

CONCORD AVE. & 143rd ST., NEW YORK



(Left) Model M and (Right) Model O Chronologs

will give several different combinations. The Model M Chronolog is of simple construction, with nothing to get out of order.

The Model O Chronolog is a very simple device which can be used in a variety of ways. It contains only one set of digit wheels, which may be arranged to count idle time or units pro-

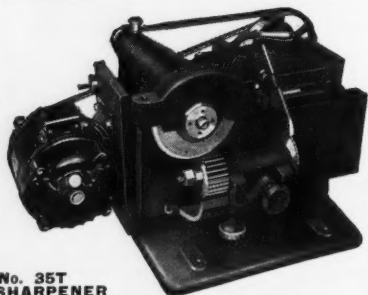
duced. It also carries a tape roll which automatically prints every ten minutes, although printing may be obtained at any time by inserting the card and pushing the button on the front. This is believed to be the only recording counter available.

Landis 40 AX Die Head

The Landis Machine Company, Waynesboro, Pa., has added a new die head for threading large diameters, long thread lengths to their line of threading equipment.

The diametrical capacity of the head is 4 in. to 5½ in. with a pitch range of 7 to 20 threads per inch. Thread length, while not unlimited, is sufficient to take in an exceptional range. The head illustrated has a capacity of 7 in. thread on 5½ in. diameter.

The new Die Head belongs to the Landmatic Series and is of the self-opening, pull-off type for application to turret lathes and to hand screw machines. It is heat treated throughout

No. 35T
SHARPENER

AUTOMATICALLY SHARPENS METAL SAWS IN GANGS

Up to 5½" diameter and up to 1¾" thickness.
100 SAWS of 26 GAUGE CAN BE SHARP-
ENED AT ONE TIME.

The saws are automatically indexed and sharpened within a variation of plus or minus .001 of exact diameter of entire lot.

WRITE FOR CIRCULAR

THE WARDWELL MFG. CO.

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CLEVELAND, O.

Why Use A Shaper to cut Keyways when a

**DAVIS
KEYSEATER**

will do the
job so much
quicker
and
better?

Send
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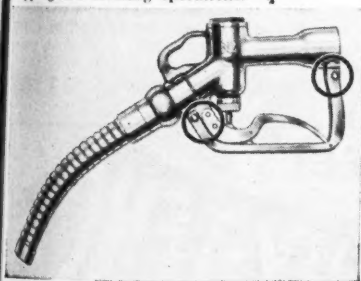
DAVIS KEYSEATER CO.

Exchange & Glasgow Sts.
ROCHESTER, N. Y.

DESIGN ENGINEERS with tough assembly problems can profit from Mr. Nicholson's letter

IN telling how he saved 80 per cent of assembly time and labor, Mr. Nicholson leaves nothing much for us to say... except that a Parker-Kalon Assembly Engineer will gladly go over YOUR work with you and point out how and where to use the various types of Hardened Self-tapping Screws to reduce costs and simplify difficult assembly problems.

Find out what you might save—Whether you now make fastenings with rivets, machine screws or by some other method... whether you assemble metal or plastic materials... requiring permanent fastenings, or fastenings that can be removed and replaced repeatedly... the chances are 7 out of 10 that you can do it better at lower cost with one of the various types of Parker-Kalon Hardened Self-tapping Screws. Have us send a Parker-Kalon Assembly Engineer to check over your work or drawings. Use his specialized knowledge to locate all fastenings that can be made the modern, simpler way, without costly tapping and riveting operations.



NICHOLSON METER & MFG. CO.

415 EAST EIGHTEENTH STREET

PHILADELPHIA, PA.

May 5, 1937.

Parker-Kalon Corporation,
200 Varick Street,
New York, N. Y.

Gentlemen:

We shall be glad to permit you to show in an advertisement the Gasoline Hose Nozzle which we assemble with Parker-Kalon Hardened Self-tapping Screws.

Whatever you may write in your copy about the benefits we obtain can be no stronger than actual facts, so you need not submit it for approval.

The truth is we saved about 80 percent of assembly time and labor, and speeded-up production at least 60 percent by using these Screws in place of rivets. We get considerably safer fastenings and without marring our chromium plated pieces. This method is a great advantage in replacing broken parts in the field. Also, our clearances are maintained exactly, whereas this was troublesome before. To us, your statement that it pays to try out your Screws is no exaggeration.

Yours very truly,
NICHOLSON METER & MFG. CO.

R. Nicholson

Photo indicates where Parker-Kalon Hardened Self-tapping Screws are used on the Nicholson Gasoline Hose Nozzle.

PARKER-KALON CORPORATION
Dept. M., 198 Varick St., New York, N. Y.

PARKER-KALON Modern FASTENING DEVICES

A HARDENED SELF-TAPPING SCREW FOR EVERY KIND OF ASSEMBLY

SOLD ONLY THROUGH RECOGNIZED DISTRIBUTORS

and ground for maximum wearing qualities. Diametrical graduations on the circumferential surface and micrometer graduations on the adjusting screw insure rapid and accurate size changes.

The 40 AX Landmatic Head carries 6 chasers mounted on the face of the head similar to the 4-chaser Die Head. By using 6 chasers instead of 4, the cutting load is more widely distributed. Thus the working parts of the head as well as the part being threaded are subject to much less cutting stress. The results are an increase in tool life with more threads obtained per grind of the

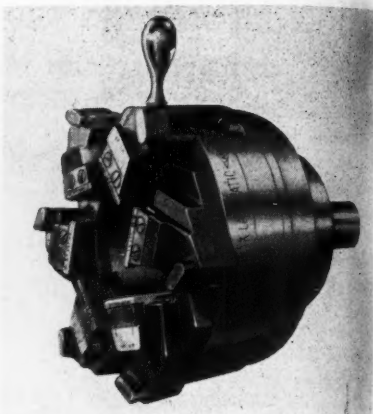


DROP FORGED STEEL

Standardized Die Sets, embodying many exclusive features, and a listing of more than 185,000 stock sizes, afford a service that is unsurpassed.

Send for Our New 288 Page Catalog

E. A. Baumbach Mfg. Co.
1806 S. Kilbourne Ave., Chicago, Ill.



Landis 40 AX Die Head

chaser, improved quality of the product being threaded, and also an increase in the life of the die head.

Excelsior No. 27-H Automatic Stainless Steel Sheet Grinding and Polishing Machine

A grinding and polishing machine for polishing large sheets in the rolling mill, to be known as "Excelsior No. 27-H" has been brought out by Excelsior Tool & Machine Co., Ridge Ave., East St. Louis, Ill. The No. 27-H machine is built to use commercial abrasive paper in any width specified for 12 and 16 ft. endless belts. The assembly is sufficiently heavy for continuous production and it is capable of withstanding the power applied to the belt without setting up vibration.

The polishing head consists of 2 steel

BETTER ALLOY STEELS



Write for your free copy of the Steel User's Data Sheets, containing valuable information on the use and treatment of special steels.

Wheelock, Lovejoy & Co., Inc.

130 SIDNEY ST. CAMBRIDGE, MASS.



CLEVELAND
CHICAGO NEWARK
DETROIT BUFFALO

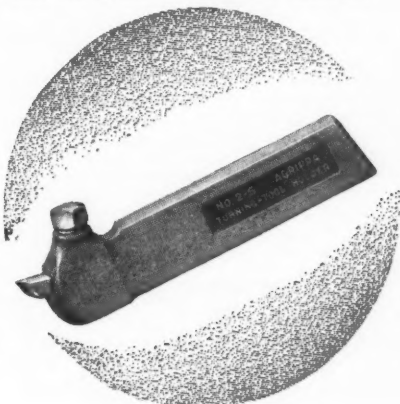
SPECIFY CLAMPS



Williams' "C" Clamps are drop-forged from tough, carefully selected steel and are heat-treated. Springing is reduced to a minimum. 5 Patterns, all sizes. Also, Strap and Machinists' Clamps.

TOOL HOLDERS

Williams' "Agrippa" Tool Holders provide for all regular operations of lathe, planer and shaper. Each line has points of distinct advantage over the usual types, yet "Agrippas" cost no more than ordinary Holders. It will pay you to send for our descriptive matter.



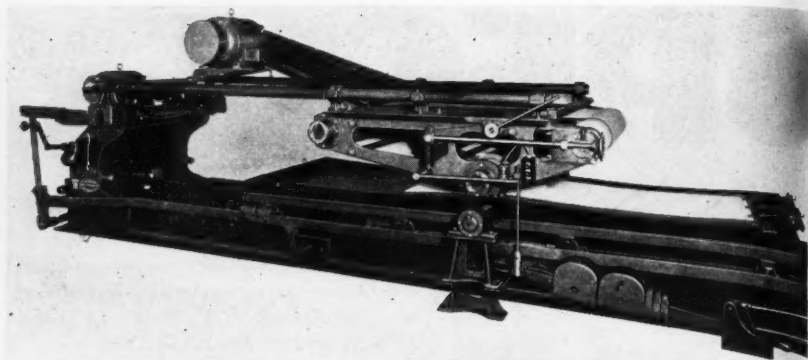
DOGS

All "Vulcan" Lathe Dogs are drop-forged. All sizes in Bent and Straight Tail patterns with either single or double screws — both *safety* and set-screw types. Also Clamp Dogs and Milling-machine Dogs.

J. H. WILLIAMS & CO.

75 Spring St., New York

Headquarters for: Drop-Forged Wrenches (Carbon and Alloy), Detachable Socket Wrenches, "C" Clamps, Lathe Dogs, Tool Holders, Eye Bolts, Hoist Hooks, Thumb Nuts and Screws, Chain Pipe Tongs, Vises, etc.



Excelsior No. 27-H Automatic Stainless Steel Sheet Grinding and Polishing Machine

diametrically balanced pulleys with shafts supported on both sides in dust proof ball bearings, mounted in 2 cast steel machine housings. By means of a centrally located flexible rubber covered pressure roll which applies the pressure to the grinding belt by gravity, any desired amount of pressure can be applied uniformly over the entire width

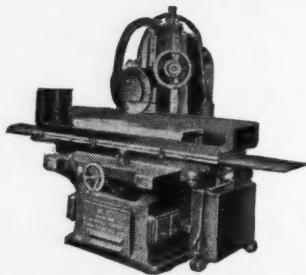
and length of the sheet.

The carriage or table is mechanically operated and adjustable to any length sheet which is passed back and forth under the grinding belt. The grinding head can be raised and the carriage stopped at the extreme forward travel for removal of the finished sheet.

There are no electrical, compressed air

SURFACE GRINDERS

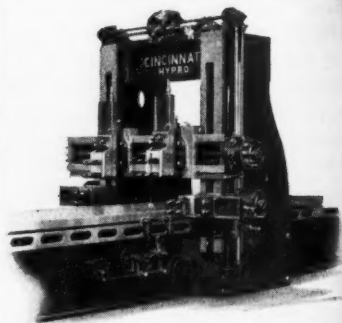
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SEND FOR NEW BULLETIN

Gallmeyer & Livingston Co.

308 STRAIGHT AVE., S. W.
GRAND RAPIDS, MICH.



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VERTICAL BORING MILLS

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COMMERCIAL DROP FORGINGS · BOARD DROP HAMMERS and DIE MAKING MACHINERY

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THE BILLINGS & SPENCER CO. HARTFORD, CONNECTICUT, U. S. A.

Wrenches

Serving Industry



The experienced workman and the apprentice in all types of industries have explicit confidence in Billings Duo Forged Tools—the unquestionable quality, practical designs and their long life on the job, plus the Billings guarantee on every Tool.

There's a definite reason. Progressive modern laboratory research, combined with years of sound forging developments and production experience, is the reason why Billings Duo Forged Tools serve industry.

Write Dept. "O" for the New "Shop Tool" Booklet.

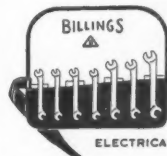
Standardize on Billings Forged Tools—it's an economy.



TEXTILE



AUTOMOTIVE



ELECTRICAL



MACHINE TOOL ASSEMBLY



MARINE



STRUCTURAL



CONSTRUCTION



OIL REFINERY



AGRICULTURAL

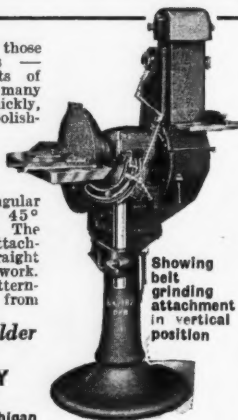
or hydraulic appliances used to operate the machine or guide the grinding belt on the pulleys, since the belt remains central after the first adjustment has been made. A 3 h.p. motor is used to operate the carriage and a 40 h.p., 1800 r.p.m. motor with V-belt drive operates the grinding belt.

The machine can be located on any floor and operated under any climatic conditions. Cranes or hoists are not required to remove and replace the grinding belts. Changes can be made in a minimum of time.

Ford, Hudson, General Electric and other leaders choose this "Oliver" Grinder

It's a wonder on those small tough jobs — grinding away bits of metal, wood and many other materials quickly, smoothly, and polishing. Its owners find it a dependable time and labor saver, extra fine for circular and angular work. Table tilts 45° down, 25° up. The belt grinding attachment is good for straight line and general work. A favorite of pattern-makers. Operates from light socket.

● Write for folder
**OLIVER
MACHINERY
COMPANY**
Grand Rapids, Michigan

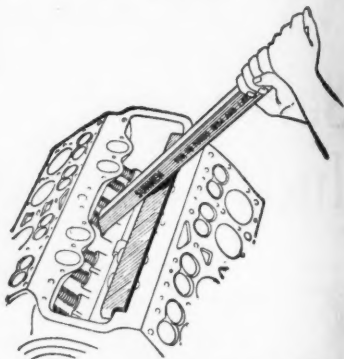


Showing
belt
grinding
attachment
in vertical
position

Heat reducing application is accentuated by applying a lubricant to the sheet. The entire process is very simple.

Sunnen Valve Lifter for 60 H.P. Ford V-8

A new L-16 Valve Lifter especially designed for removing valve spring assemblies in the Ford V-8, 60 H.P. motors has been announced by the Sun-



Sunnen Valve Lifter for 60 H. P. Ford V-8

nen Products Company, 7903 Manchester Ave., St. Louis, Mo. This new lifter, known as the Sunnen L-16, is made of extra heavy square tubing guaranteed not to bend even when prying out the most stubborn valve assemblies.

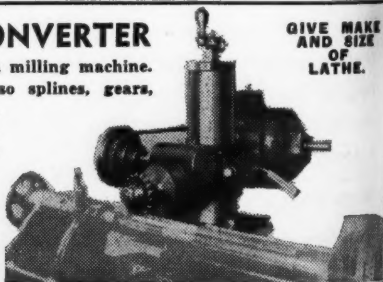
A protector plate is furnished with the L-16 which protects the sharp edge of the motor block from injury. With the L-16 the spring is raised by using the large notch end of the lifter. After the prop is inserted, the valve assembly is pushed down and lock on the

THE MASTER LATHE CONVERTER

In conjunction with an engine lathe becomes a milling machine. Will mill keyways, internal and external—also splines, gears, etc. It hobs worm gears. It grinds internally, externally, face plate, shaft—at all angles. An entirely new geared type dividing head for lathes now available.

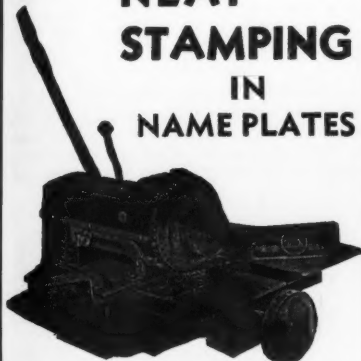
Write for illustrated pamphlet.

MASTER MACHINE & TOOL COMPANY
P. O. Box 7365, North Kansas City, Missouri.



GIVE MAKE
AND SIZE
OF
LATHE.

NEAT STAMPING IN NAME PLATES



This machine quickly stamps details and serial numbers into name plates.

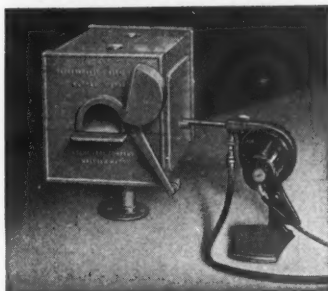
Write For Particulars

GEO. T. SCHMIDT, Inc.
1806 Belle Plaine Ave., Chicago, Ill.

"Stark"

"ELECTROBLAST"

High Speed Heat in 20 Minutes

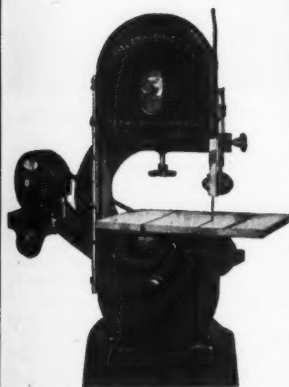


Powerful torch used separately as a very handy portable flame, \$40. High Speed Muffle Furnace, no scaling or decarburization; reaches high speed heat in 20 minutes at 7c per hour; quickly saves its cost. Muffle 7"x3 1/4"x2 1/4", \$40. Also a larger furnace with built-in torch, muffle 7"x4 3/4"x3 1/2".

STARK TOOL CO.

Originators of the American Bench Lathe
Est. 1862 WALTHAM, MASS.

RACINE DUPLEX BAND SAW



Two Speeds—for cutting wood, steel, brass, copper, tubing, angles, templates.

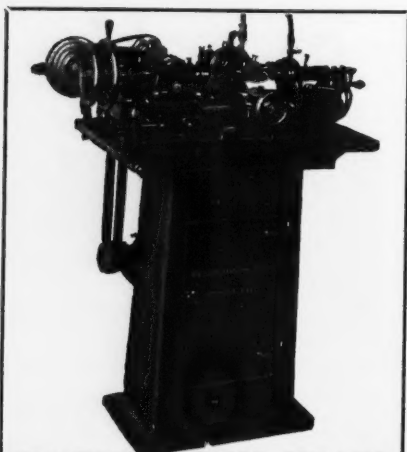
The ideal all around machine for production shops, tool rooms, pattern shops, laboratories.

Accurate — Fast — Rugged — Modern.
High Grade Construction.

RACINE TOOL & MACHINE CO.

1770 STATE ST.

RACINE, WISCONSIN



WALTHAM THREAD MILLER

Let us explain why this machine is largely used for special taps, single and multiple worms, etc., in tool rooms and factories.

WALTHAM MACHINE WORKS
WALTHAM, MASS.

HIGH SPEED SHEARING

**Of Irregular Shapes
Ring and
Circle
Cutting**

The ideal shear for sheet metal work—absolutely accurate and easily operated . . . metal is sheared and not punched . . . cut anywhere, no starting holes required for inside cutting . . . only one adjustment for various thicknesses of material used . . . material does not feed itself by action of the cutters . . . unobstructed cutting vision . . . no further finishing required. No special cutters, pilots, templates, or strippers are needed . . . long life shear blades. Standard equipment furnished for ring and circle cutting. Write for complete information.

LIBERT MACHINE CO.
GREEN BAY, WISCONSIN
Manufacturers of shears since 1915

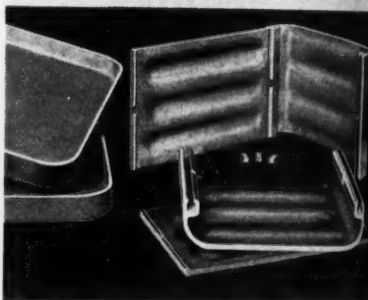
Libert Method



bushing slipped out. The entire assembly can then be pushed up out of the block. Direct force can be applied to the stuck guide directly by using the other end of the lifter with a small notch, inserting it through the spring coil just below end of valve guide.

Hoffman "Flexbox"

The American Manganese Steel Company, Chicago Heights, Ill., is introducing the Hoffman "Flexbox" for use in carburizing, annealing and other heat treating processes.



Hoffman Flexbox for Heat Treating

treatment processes. Greater operating efficiency is claimed for it as the outcome of recent tests in production carburizing.

The "Flexbox" is made in six separate parts of heat and abrasion resistant Amsco alloy. The corrugated sides are tongued to fit into grooves in the corrugated ends and may be keyed in place. The frame thus formed nests on a flanged bottom plate with legs for batch type furnaces and has a flanged cover which fits over the box. A special type of "Flexbox" is made with the bottom plate fitting and plates for use where the contents must be lifted with the box.

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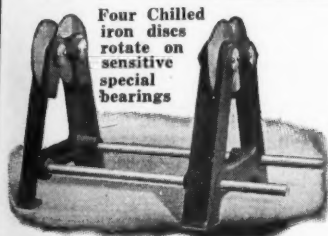
Improved Anderson Balancing Ways

No Leveling
Required

A simple
and excellent
device for
balancing,
straightening
and truing.

They are made in
the following sizes:

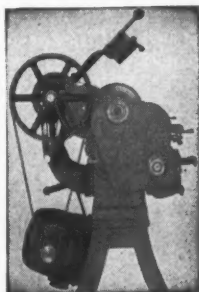
Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000



Four Chilled
iron discs
rotate on
sensitive
special
bearings

Write for Full Information
Made by **Anderson Bros. Mfg. Co.**
1926 Kishwaukee St., Rockford, Ill.

Sebastian Motor Drive Attachment For Cone Head Lathes



● For any make of lathe from 8" to 20" swing. Does not obscure vision. Easy to attach—low in price.

12" SIZE.....\$55.00
16" SIZE..... 63.00
20" SIZE..... 90.00

The Sebastian Lathe Co.
CINCINNATI, O. U. S. A.

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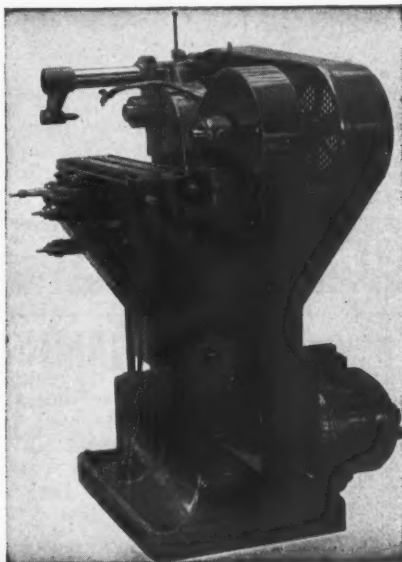
NEW U. S. No. 1 Anti-Friction Bearing Hand Milling Machine

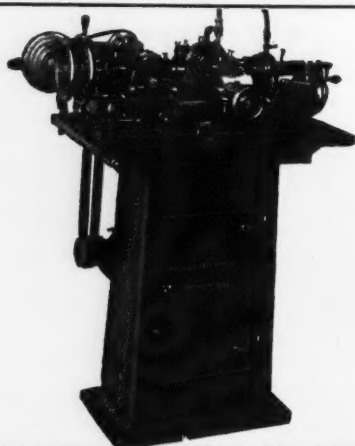
The New U. S. Hand Miller is particularly adapted to high speed light milling operations. Vertical and horizontal feeds.

Improvements: Heat treated chrome nickel steel spindle, Timken bearings, Ballbearing countershaft, V-belt drives, 6 Spindle Speeds up to 1592 R.P.M., providing efficient use of small end mills.

Write for full details.

**The UNITED STATES
MACHINE TOOL Co.**
1954 W. 6th St., Cincinnati, Ohio





WALTHAM THREAD MILLER

Let us explain why this machine is largely used for special taps, single and multiple worms, etc., in tool rooms and factories.

WALTHAM MACHINE WORKS
WALTHAM, MASS.

HIGH SPEED SHEARING

**Of Irregular Shapes
Ring and
Circle
Cutting**

The ideal shear for sheet metal work—absolutely accurate and easily operated . . . metal is sheared and not punched . . . cut anywhere, no starting holes required for inside cutting . . . only one adjustment for various thicknesses of material used . . . material does not feed itself by action of the cutters . . . unobstructed cutting vision . . . no further finishing required. No special cutters, pilots, templates, or strippers are needed . . . long life shear blades. Standard equipment furnished for ring and circle cutting. Write for complete information.

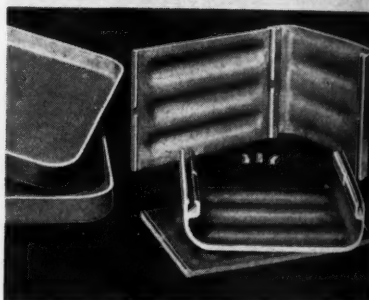
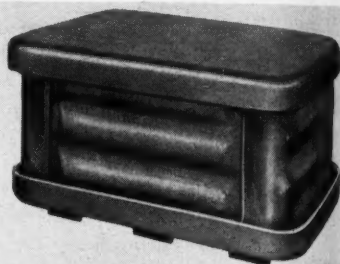
LIBERT MACHINE CO.
GREEN BAY, WISCONSIN
Manufacturers of shears since 1915

Libert Method

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Hoffman Flexbox for Heat Treating

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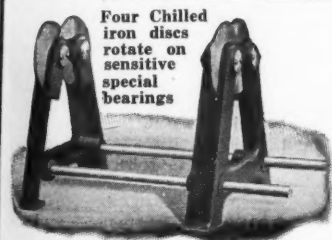
Improved Anderson Balancing Ways

No Leveling
Required

A simple
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They are made in
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Swing	Greatest Distance Between Standards	Capacity in lbs.
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72 in.	66 in.	5,000
96 in.	88 in.	10,000



Four Chilled
iron discs
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Write for Full Information
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The Sebastian Lathe Co.
CINCINNATI, O. U. S. A.

NEW

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The New U. S. Hand Miller is particularly adapted to high speed light milling operations. Vertical and horizontal feeds.

Improvements: Heat treated chrome nickel steel spindle, Timken bearings, Ballbearing countershaft, V-belt drives, 6 Spindle Speeds up to 1592 R.P.M., providing efficient use of small end mills.

Write for full details.

**The UNITED STATES
MACHINE TOOL Co.**
1954 W. 6th St., Cincinnati, Ohio



It is claimed the "Flexbox" does away with the distortion or cracking commonplace in furnace boxes of solid cast or welded construction, brought about by alternate heating and cooling. Sufficient clearance is provided between tongue and groove to absorb expansion from heating of the parts and to allow contraction in cooling. With this new design, however, there is no appreciable gas leakage at the joints.

"Flexboxes" are lighter than ordinary boxes; therefore easier to handle. Should a section of the box fail, it can be

easily and quickly replaced at a fraction of the cost of an entire box. Descriptive literature is available from the maker of this equipment at their Chicago Heights, Illinois office.

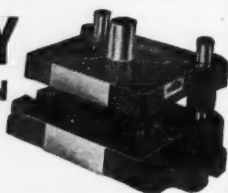
Microhoner

It is now possible to hone bores down to $\frac{1}{4}$ in. diameter, in production, with tolerance for roundness and straightness held down to twenty-five millionths of an inch, by the use of the No. 1 Microhoner, now being announced by the Microromatic Hone Corporation, Dubois and Horton Sts., Detroit, Michigan. The Microhoner is a new type of honing machine for production work to handle diameter range from $\frac{1}{4}$ in. to $\frac{3}{4}$ in. with maximum length of 23 $\frac{1}{2}$ in. for smaller diameters up to and including 7 $\frac{1}{2}$ in. for larger diameter sizes.

Production ranges up to 180 to 200 pieces per hour, removing 0.0007 to 0.001 in. of stock from a ground hole in hard metal, and as much as 125 to 150 pieces per hour, depending upon bore diameter and length, removing from 0.001 to 0.002 in. of stock from a reamed, broached, or precision bored hole in cast iron or soft steel. "Microhoned mirror Finish" is produced with a free cutting action in one operation from a ground surface on hardened parts or a precision bored, reamed or broached surface on soft steel or cast iron, as well as some non-ferrous metals.

The Microhoner incorporates the unique and simplified principle of a wobble plate, indicated at No. 4 in Fig. 2, to obtain a high speed, mechanical reciprocating motion, which, combined with rapid rotation, accomplishes the required spiraling or helical travel of the abrasive to produce a cross-hatched honed finish. Any desired variation of crosshatch, or relative speeds of opera-

DANLY PRECISION DIE SETS



Danly All-Steel Sets
Danly Commercial Sets
Danly Die Makers' Supplies

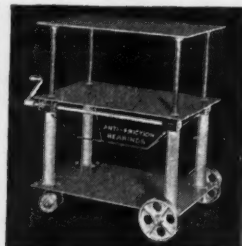
DANLY SERVICE

8 Danly Warehouses Provide
24-Hour Service for 85% of
All Metal Fabricating Plants

DANLY MACHINE SPECIALTIES, INC.

2122 South 52nd Avenue, Chicago, Ill.
513 East Buffalo Street, Milwaukee, Wis.
Long Island City, N. Y., 38-12 34th Street
Dayton, Ohio, 990 E. Monument Avenue
Detroit, Michigan, 1549 Temple Avenue
Rochester, N. Y., 16 Commercial Street
Cleveland, Ohio, 1745 Rockwell Avenue
Philadelphia, Pa., 3913 North Broad Street

DANLY DIE MAKERS' SUPPLIES



HAMILTON ELEVATING TABLES

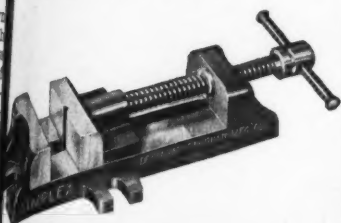
Save time and money in lifting and handling heavy dies, tools, etc., in your tool room or stamping shop. All steel construction—anti-friction bearings—furnished with hand or electric power. Special tables built for your requirements. Write for illustrated circular.

THE HAMILTON TOOL CO.

HAMILTON

OHIO

SIMPLEX DRILL PRESS AND MILLING MACHINE VISE



well designed, strongly constructed vise for general shop and tool room use on drill presses and milling machines. Has "V" slot for holding round vertical work and exclusive bronze bushing insures easy operation of the screw.

Write for circular "M" and name of your nearest dealer.

Desmond - Stephan Mfg. Co.
URBANA, OHIO

STEEL EQUIPMENT

- Stools and Chairs
- Blue Print Cabinets
- Machine Tenders
- Foreman's Desks
- Bench Drawers
- Tool Cabinets
- Work Benches
- Bench Legs



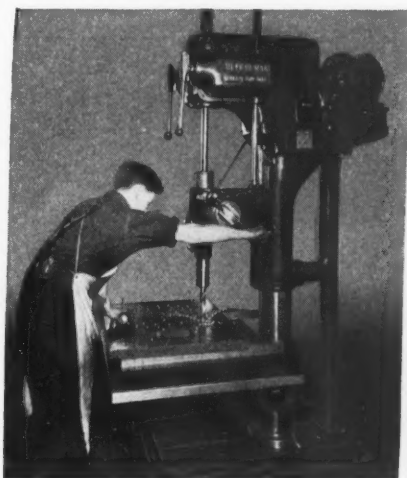
No. 44 DS Stool

Write for Catalog
"JE"

ANGLE STEEL STOOL CO.

"The Steel Equipment People"
PLAINWELL, MICH.

CLEEREMAN DRILLING MACHINES



Sliding Head—

Round or Square Column

At work in the plant of the Brust Tool Manufacturing Company, Chicago, well known makers of precision tools and fixtures, this round column 25" Cleereman Drill is giving highly satisfactory performance . . . It is fully geared . . . has anti-friction bearings . . . is automatically oiled . . . has single lever control of feeds and speeds . . . can be furnished with square column and in special arrangements . . . Write for descriptive bulletin.

Cleereman Machine Tool Co.

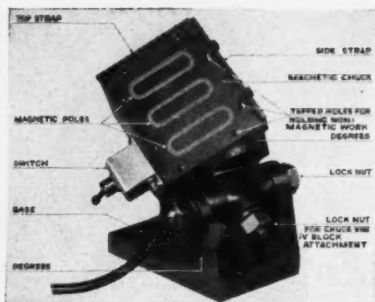
GREEN BAY, WIS.

tion can be obtained by interchange of pulleys (14).

Unit time cost per piece is minimized by leaving the operator's hands free for holding the work, or for making adjustments and providing foot control for starting and stopping the machine. A single foot movement by the operator engages the clutch and expands the hone to start the machine. One foot movement stops reciprocation and rotation, while releasing the clutch and applying the brake simultaneously with the collapsing of the hone.

The same proven features of construction and operation incorporated in

COMPOUND ANGLE MAGNETIC CHUCK



For Grinding Tungsten Carbide Tools,
Form Tools, etc.

Write for Circular.

Grinding Machinery Co.

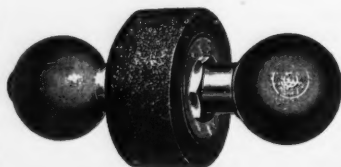
2832 E. Grand Blvd., Detroit, Mich.

AGENTS WANTED



Fig. 1—No. 1 Microhoner.

all Micromatic production honing tools are also included in the Microhoner, and comprise: Constant Pressure of Abrasive—The honing sticks are held rigid against the bore wall by a controlled constant pressure which is regulated through a caged feed spring (6) independent of the influence of the operator. The angle of taper on the stone holders and the body of the tool is beyond the angle of reversibility so that no amount of pressure on the stones will collapse the tool by backing



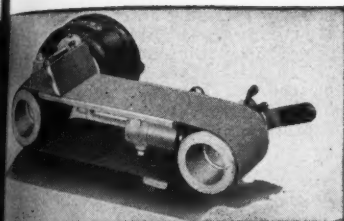
Metcalf Emery Wheel Dresser

Dresses wheels up to 14" diameter and can be used on all kinds of wheels . . . Cuts out bond or filing and leaves cutting particles standing out sharp and clear . . . Does not grab and tear the wheel . . . Prevents chipping of the wheel.

Send for descriptive bulletin.

COVEL-HANCHETT Co.

BIG RAPIDS • MICHIGAN • U. S. A.



NEW ABRASIVE BAND GRINDER...

"Built Like a Machine Tool"

The Hormel-M Grinder is sturdily built with supporting leg under the grinding table to minimize vibration and tipping due to pressure on the belt. Ball bearing throughout. Equipped with ALEMITE LUBRICATION complete with grease gun.

Write for illustrated folder on this and other styles and sizes.

HORMEL-M GRINDER
WALLS SALES CORP.

WARREN ST. NEW YORK, N. Y.



Counters for Metal Working Machines

Production on punch presses and many other machine tools is checked off accurately by these sturdily built Productimeters, B-1 above wing nut reset, or tumbler lock reset.

Productimeters
[THE SPEEDMETERS OF INDUSTRY]

DURANT MFG. CO.

1932 N. Buffum St. 173 Eddy St.
Milwaukee, Wis. Providence, R. I.

TELL US WHAT YOU WANT TO COUNT

MORE FOR YOUR MONEY

in *The Cincinnati*

12" & 14" Pedestal Grinders

You get "more for your money" in these NEW 12" and 14" Pedestal Grinders. These fine new tools have the same high quality as always yet look at these remarkable prices.

Grinder complete with 2 H.P. motor and two 12"x2" wheels, \$200.00.

Grinder complete with 3 H.P. motor and two 14"x2½" wheels, \$250.00.

Send for new Catalog, just off the press.

THE CINCINNATI ELECTRICAL TOOL CO.

CINCINNATI • OHIO • U. S. A.

Division of R. K. LeBlond Machine Tool Co.
Builders of Electric Drills, Screw Drivers, Nut Setters, Tappers, Valve Grinders, Aerial Grinders, Tool Post Grinders, Buffing & Polishing Lathes, Bench and Pedestal Grinders.



SAME
HIGH
QUALITY

NEW
LOW
PRICE

up the feed spring. Automatic Feed;—Continuous feed or expansion of the stones (7) during each cycle of operation is obtained without resetting by the operator for each piece of work honed. Predetermined Setting Device;—Expansion of tool is controlled through

constant pressure which is regulated through a caged feed spring, independent of the influence of the operator. The angle of taper on the stone holder and the body of the tool is beyond angle of reversibility so that no amount of pressure on the stones will collapse the tool by backing up the feed spring. Continuous feed or expansion of the stones, during each cycle of operation, is maintained without resetting by operator for each piece of work honed. Expansion of the tool is controlled through calibrated adjustment which can be made while the machine is in operation.

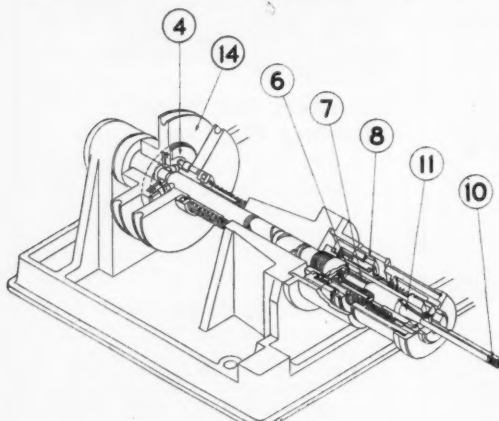


Fig. 2—Drawing illustrating features of design of No. 1 Microhoner

calibrated adjustment (8) which can be made while the machine is in motion. Low Operating Cost;—Abrasive sticks are mounted on inexpensive die cast holders (10) which are easily and quickly replaced on machine. Interchangeable Hone Bodies;—Hone bodies are available for every 1/32 in. (.79 mm.) increase in diameter of bores. All hone bodies (11) are interchangeable on the machine, and are made with bayonet lock to facilitate quick interchange.

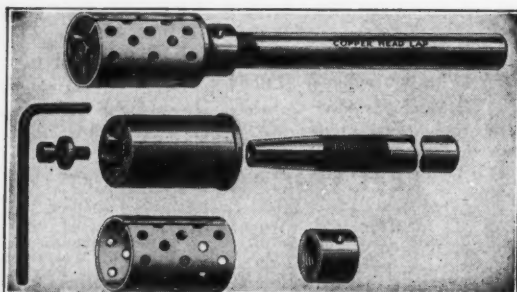
The honing sticks are held rigidly against the bore wall by a controlled,

All working parts are made of hardened or heat treated steel and the machine will withstand long, hard service. Steel bodies, made with bayonet lock for quick interchange, are available for every 1/32-in. increase in bore diameter within the above range. Stones are mounted on inexpensive die cast stone holders and are easily and quickly replaced on the machine.

The machine is equipped with coolant tank, pump and efficient filter, with the discharge connected to the honing spindle head. Standard motor equipment includes 1/2 h.p., 1725 r.p.m., 60 cycle, 3 phase electric motor.

Eisler Air-Operated Spot Welder

An air-operated spot welder designed so that the welds are controlled by means of a solenoid starter has been brought out by Eisler Engineering Company, 740 South 13th St., Newark, N. J. By depressing the starter, the solenoid actuates the air cylinder which in turn



LOWER YOUR LAPPING COSTS

With Copper Head Expansion Lapping. Profitably used in hundreds of lapping shops. Available in sizes from 1/8" to 2 1/2", graduated by sixteenths of an inch.

Many other designs for special applications.

Write for Bulletin

BOYAR-SCHULTZ CORPORATION

2120 Walnut Street, Chicago, Ill.

STOP BELT SLIPPING!



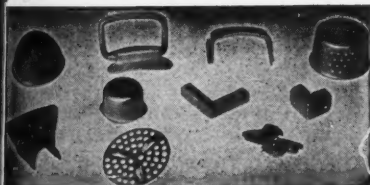
Pat'd U. S.,
Canada,
Great Britain

VACUUM CUP METAL PULLEYS

Guaranteed to: Eliminate belt slippage and power loss . . . Increase life of belts and equipment . . . wear indefinitely . . . keep belts from flying off. Belt is sealed to pulley at vacuum contacts. Order now on 30 Day Free Trial Offer. Used in many of the largest plants.

Vacuum Cup Metal Pulley Co., Inc.
1010 Ford Bldg. Detroit, Mich.

STAMPINGS



We have been in the job stamping business for over 20 years, and have a well equipped plant with 30 presses ranging from small size up to 30 ton ram pressure.

We are equipped to make our own dies in our modern die shop.

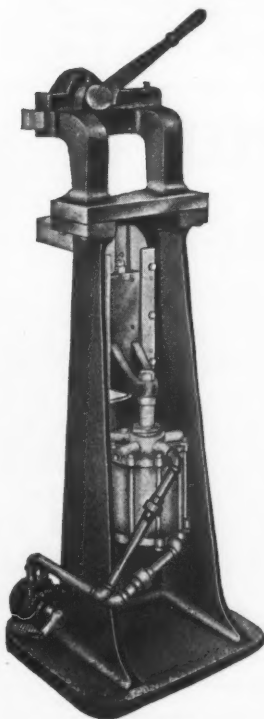
Send sample or blueprints for estimate to Dept. 1.

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BY ROLLING
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MODEL 25

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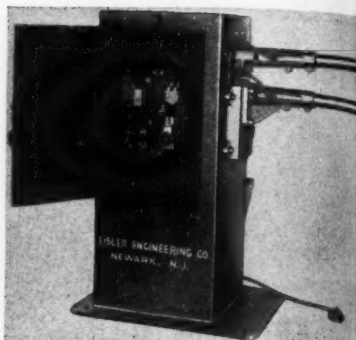
This machine operates from your plant air line, and is one of numerous models built to produce fast, neat marking on metal parts. Hi-Duty marking machines may be had for practically any marking operation, and we will be glad to make recommendations upon receipt of your inquiries. Send prints or samples of parts to be marked, showing lettering and location, also state required production.

GEO. T. SCHMIDT, Inc.

1806 BELLE PLAINE AVE.
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closes the electrodes upon the work. The duration of the welding period is regulated by the automatic timer and contactor, assembled on the side of the fabricated frame. The timer is adjustable to regulate current from 2 to 60 cycles in 110 divisions. An air pressure valve on the machine is used to regulate the proper air pressure; this welder operates on an air pressure of 35 to 60 lbs., depending on the nature of the work.

Variation in type of work is facilitated by the interchangeable arms available on this welder. Arms shaped for



Eisher Air-Operated Spot Welder

welding different types of work can be substituted for the arms illustrated; the lower arm can also be raised or lowered to conform to the depth of work required. This welder is especially equipped with strong arm supports. These supports make possible the long arms, and at the same time, permit the arms to slide in or out of the supports to suit the type of work being welded. A water cooling arrangement passes water through the arms, electrode holders, and electrodes—water is circulated very close to the end of the electrodes. The arms on this welder are 36" long; arms can be supplied from 36" to 48" in length.

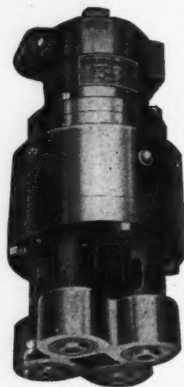
This welder is capable of making up to 100 spots per minute. It is equipped with an 8-point hand wheel for hand regulation and has an air-cooled transformer.

Pioneer Coolant Pump

The Pioneer Engineering and Manufacturing Company, 31 Melbourne Ave., Detroit, Mich., announces the Pioneer Horizontal Pump for coolants and lubri-

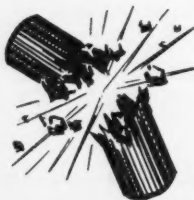
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U. S. Multiple Drill Heads are made for drilling 4 to 50 holes at once. Thus, you get more holes per minute and larger profits. Our years of specialization in this work will save you money and assure an accurate, dependable and swift job. Send your blue prints for estimates.



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is every day for the shop in which direct motor drives have replaced dangerous, costly-to-maintain overhead line shafting. Such shops find that their saving in replacement belting alone frequently pays for a complete Remco installation. A bang-up proposition! Bringing good reports from users everywhere. Join them! Write for FREE folder. Manley Products Corp., State & Hay Sts., York, Pa.

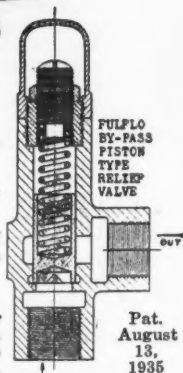
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OIL BY-PASS RELIEF VALVE

- Sturdy construction
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Made in either bronze or cast iron with pipe sizes from $\frac{1}{4}$ " to $1\frac{1}{2}$ ".



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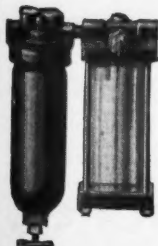
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RATING OF OVER
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Furnished with adaptor for use in tool post of machine for internal jobs.



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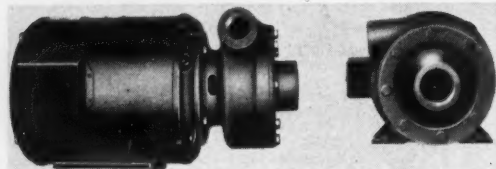
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cants. The new unit is an open impeller type pump directly connected to a full ball bearing, long hour, moisture proof motor.

This type of pump has a number of worthwhile advantages of particular interest to machine tool builders and



Pioneer Horizontal Pump

users. It has been designed and built for maximum efficiencies and maximum heads. It is ideally suited to installations where maximum heads are essential, as, for instance, in multiple or deep hole drilling, in coolant supplies that are filtered or in central reservoir systems serving a battery of machines. It offers the further advantage of providing greater volumetric control and maximum flexibility in both application and service.

Although the pump is normally installed in a horizontal position, it is not limited to horizontal installation. Due to special bearing design it may be set vertically if desired. Its performance will be the same in either case. Instead of the conventional packing gland, a special mechanical seal is used at the shaft opening. This permits shortening the distance between the pump bearing and the impeller by from 4 to 10 inches—making the installation very much more compact and preventing shaft whip otherwise so troublesome in the impeller type of pump.

The special type of seal used eliminates shaft friction and its resultant heat and power loss, unavoidable under conventional packing gland construction. Likewise it eliminates the need for repacking at intervals throughout the service life of the pump. The mechanical seal requires no such servicing.

In pumps of this type increasing the effective head reduces power demand. When the head is increased to infinity, as it is when the discharge line valve is closed, power demand drops to a point just sufficient to overcome the hydraulic

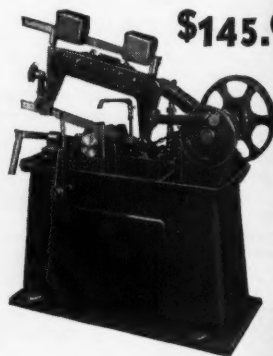
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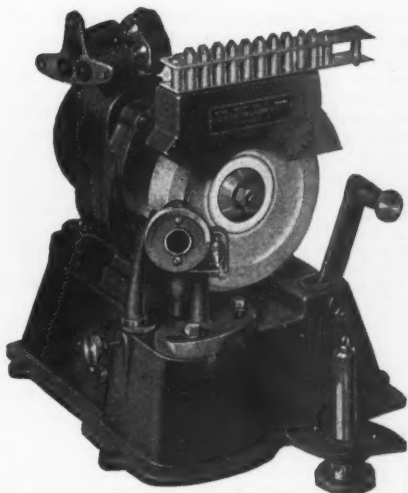
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Tool protected by U. S. Patent No. 2047147

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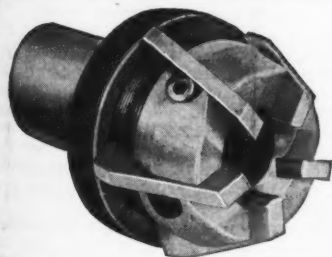
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friction of the impeller. Conversely, reduction in effective head increases power demand in the same ratio. Thus a motor operating at capacity in an installation having a very high head will not be suitable if the head is materially reduced because of the serious overloads developed. To avoid any possible operating difficulty of this character the Pioneer Pump is powered for the lowest possible head. Consequently, regardless of how the effective head may be varied, Pioneer Pumps will not suffer overloading from that cause.

From the above, it will be evident



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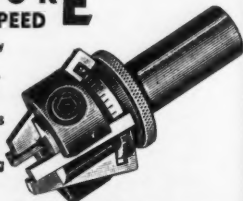
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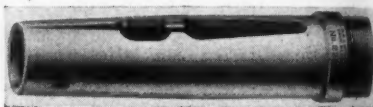
837 Lake Ave., ROCHESTER, N. Y.

that the impeller type pump requires no relief to bypass valves in the delivery line to protect the pump when coolant supply is throttled. This simplifies pump piping and reduces its cost.

Another advantage is that this unit operates at normal motor speeds—no speed reductions are necessary unless highly viscous liquids are encountered. Inasmuch as single phase, two or three phase motors are available with this pump, its use does not necessitate unbalancing the phase load of the plant. The Pioneer Horizontal makes an ideal pump for remote location such as the handling of coolant or lubricant for a group of machines from a single central reservoir.

B & S Master Feeding Finger

The illustration shows the master feeding finger and pads which have been brought out by Brown & Sharpe Mfg. Co., Providence, R. I. The finger is made of high grade steel and is given



B. & S Master Feeding Finger

a spring temper treatment in order to obtain the maximum tension for holding the pads and stock. Pads of hardened steel, bronze or cast iron can be used and are interchangeable. The two pads used with the finger take the wear from the manufacture of screw machine products.

The hardened steel pads are suitable for most screw machine jobs and have the advantage of providing the maxi-

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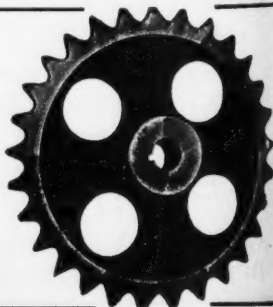
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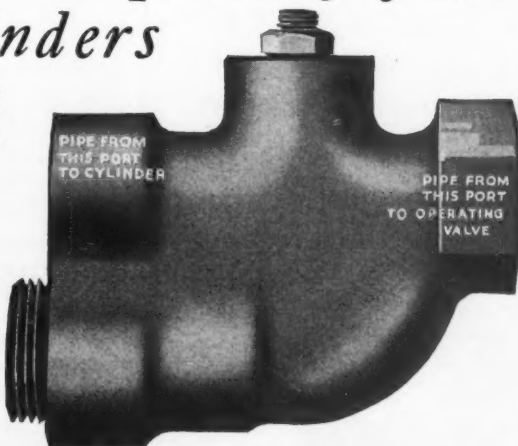
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Make them function as fast or as slow as you wish without affecting the pressure of course.

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Iron Pipe Sizes.

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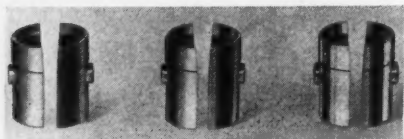


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mum life. Bronze pads are somewhat superior for feeding polished stock as they have less tendency to mar or injure the surface finish. Cast iron pads offer a wear life longer than that of bronze and are suitable for feeding polished stock where the requirements are not



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so severe as to demand bronze pads.

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chine Serial No. 227. The No. 22M Fingers are intended for use with the Nos. 2 and 2G Automatic and Nos. 2 and 2G Wire Feed Machines commencing with Machine Serial No. 383.

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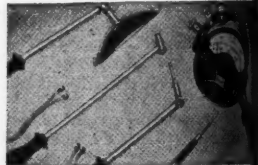
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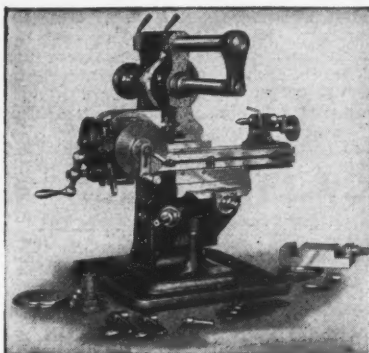


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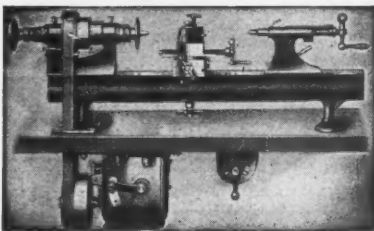
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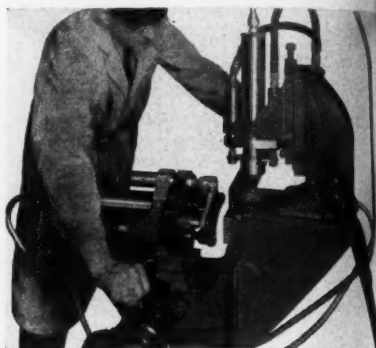
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which with a single movement starts the punching operation.

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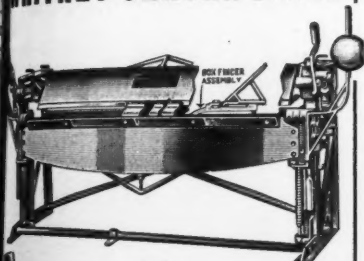
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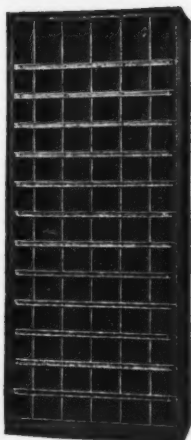
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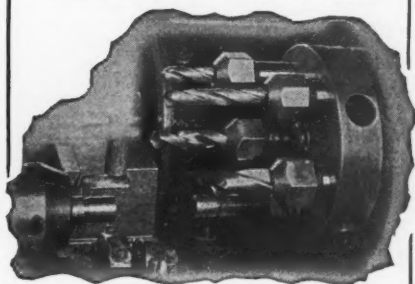
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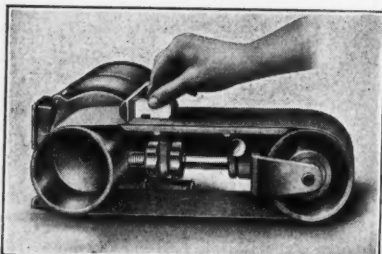
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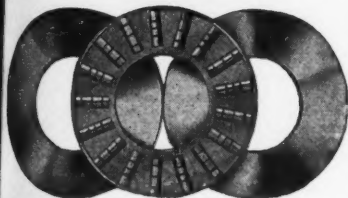
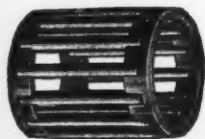


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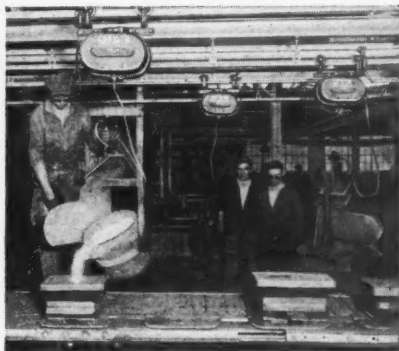
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Loads of 500 pounds or under are still being HAND'ed by manpower or with inadequate mechanical assistance. In many of these cases a 1/4-ton Lo-Hed Hoist would not only release a man but do the work far better and faster at, of course, a saving. For example, in one foundry, 1/4-ton Lo-Hed Hoists operated by one man are used for pouring along mold conveyors. The operator can devote all his attention to maneuvering the spout into the right position for the important job of pouring. Look into the possibilities of the 1/4-ton Lo-Hed and of the other 98 standard Lo-Heds. Send coupon for new Lo-Hed catalog.

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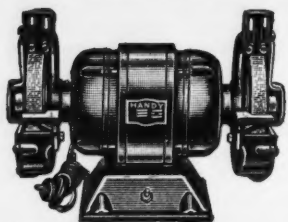
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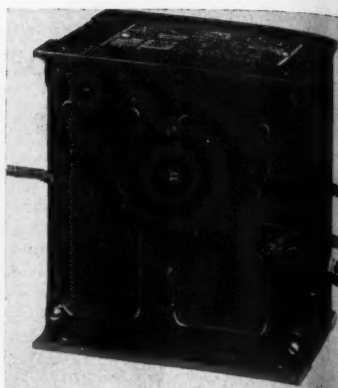
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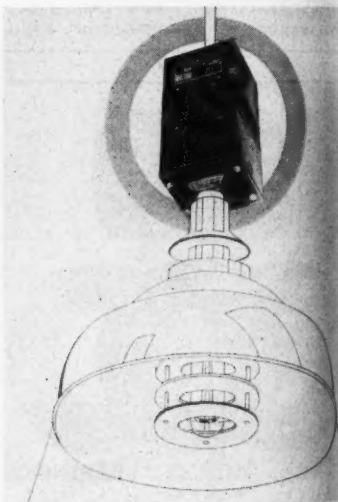
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Efficient—
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Complete Line Of
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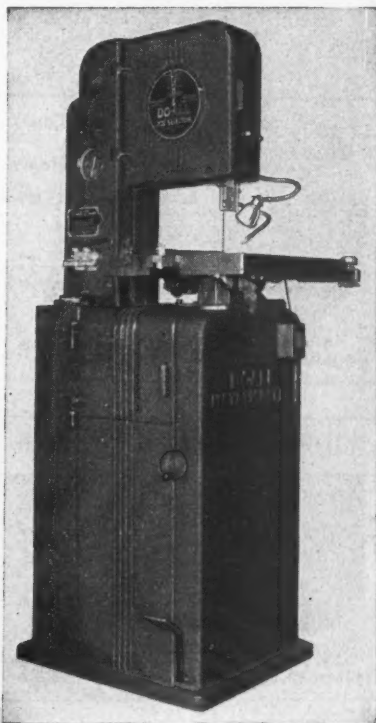
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A small test indicator built integral with a universal holding bar and having a swivel contact point has been placed



Federal Model 2 Test Indicator with Universal Bar

on the market by Federal Products Corporation, 1144 Eddy St., Providence R. I. The indicator is unusually light, compact and accurate. The dial is graduated to 0.0001 in. The indicator can be used in connection with surface gages, height gages or tool posts and is quickly adapted to special fixtures. Its lightness and sensitivity are of special value with regard to accuracy when used with



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Re-Wheel Your Trucks Save Your Floors

Do the Job Right with Metzgar End-Wood Wheels.

Easy-Rolling.
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Wheels for all trucks.
Castors for all purposes.
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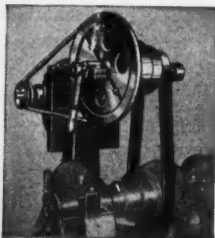
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Automatic Brake.
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STEEGE Junior Motor Drives

Adaptable to Any Cone Pulley Machine!

Give higher production at lower cost—are simple and easy to operate—pay for themselves in savings. Send for catalog.

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**MADE OF ALLOY STEEL
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Acme Standard
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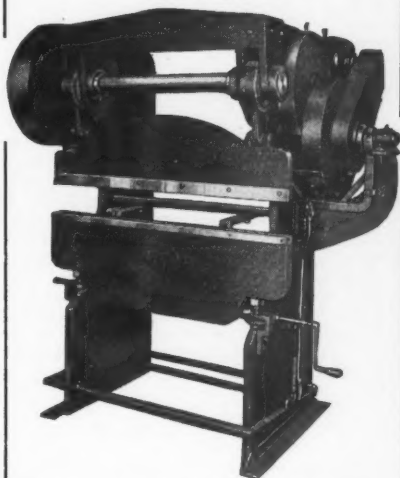
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No. 253



**Does 40% to 60% of the
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by the average shop.**

Here's a profitable, economical brake ideally adapted for rapidly forming metal sections such as in stoves, refrigerators, soda fountains, steel cabinets, metal furniture, steel boxes, and a great variety of sheet metal specialties. Its variable speed drive operates from 17 to 50 strokes per minute. The No. 253 CHICAGO STEEL PRESS is accurate, compact, and ruggedly constructed of highest quality materials.

Sizes 4, 5 and 6 ft. capacities, up to 10 gauge.

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7418 LOOMIS BLVD.
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light supporting members. By merely shifting the reversing lever the motion of the point is reversed. A Federal Low-Friction Jeweled movement is used.

The holding bar is $\frac{1}{4} \times \frac{1}{2} \times 3$ in. long from center of the clamping post to the end and the diameter of the clamping post is $\frac{1}{4}$ in. The dial is of the rotating type, $1\frac{1}{2}$ -in. diameter and the range of the graduations is 0.008 in. Weight, without bar, 33.35 grams.

Sullivan Industrial Compressor

The Sullivan Class WN-112 Air or Gas Compressor, now being made by Sullivan Machinery Co., Michigan City, Ind., in displacement sizes of 378, 480, 642 and 800 cubic feet per minute, is claimed to have great economy of power, maintenance, investment, installation and space. The most advanced design, with the use of modern alloys and precision manufacture, make the performance of this new industrial compressor outstanding. It is a continuous heavy duty machine which, while built for any type drive, reaches its greatest efficiency with the built-in motor. Thus equipped it requires only 6 feet by 8 feet floor space for any of the above capacities.

Vacuum pumps, boosters for steam or gas and low or high pressure machines are available in this new type of construction. The compressor is equipped



Sullivan Class WN-112 Compressor

with the new "Dual-Cushion" Valves, a feature just recently perfected by Sullivan engineers.

The compactness and ease of installation of the Sullivan WN-112 compressor

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The "Alnor"
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Ideal for rolls,
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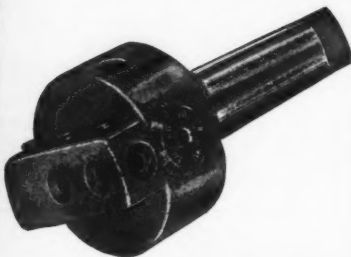
—Cut Cost— **of removing broken taps with WALTON TAP EXTRACTOR**

Here is a practical indispen-
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taps quicker than any other
known method. When the
tap breaks off at or below the
surface of the work — simply
insert the Walton Tap Extrac-
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of the broken tap and back
it out, with no damage to
the threads. This tool will
usually pay for itself in re-
moving the first broken tap.

Try it on 60 days free trial
offer. Send for descriptive cir-
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THE WALTON COMPANY
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CRALEY OFF-SET BORING HEAD



No. 4 Head for Boring holes
to 10" diameter. These Boring
Head Sets are made in six
sizes. Write for Prices.

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**EVANS REAMERS
SURPASS ALL.
HIGH SPEED STEEL.**

**No Honing.
Chrome Like Finish.**

50 to 80 thousandths expan-
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Full Bearing Surface.

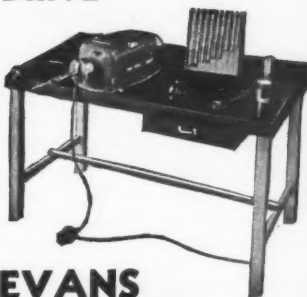
Perfect Alignment.

Will not chatter.

With Left and Right Spirals.

It can not fall in slots or oil
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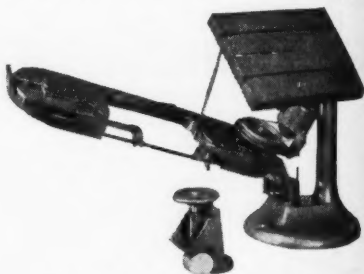


make it ideal for supplementing present equipment and it can be easily installed at any convenient point where electric power and running water are available.

Wells No. 7B Vertical Band Saw

The Wells Manufacturing Corporation, Three Rivers, Michigan, is manufacturing an upright saw, designated as No. 7B, particularly designed for foundry work. It has nine speeds ranging from 60 to 1400 ft. per minute. The saw is so flexible that it lends itself to a great variety of work. It has a throat

clearance of 14-in. vertically and 14½ in. horizontally. It may be used in a rigid upright position for sheet metal, pattern work, sawing sprues off castings, or any work for which a rigid upright saw is applicable. The table is arranged



Wells No. 7B Vertical Band Saw

to tilt 45 degrees right and 10 degrees left.

The upright saw frame is hinged at the bottom and may be released and fed into the stock automatically. The stock is clamped on the table with a vise which is provided, or by using the T-slots and clamps, a greater variety of work may be done.

The upright frame may also be swung down to the floor where gates and risers may be cut off from large castings which are too heavy to place on the table. The capacity at this point is 14x18 in. Bar stock up to 6 in. may also be cut at this position. In fact, this machine lends itself to an incredible variety of work that it seems surprising.

Link Spring Checker

A compact, self-contained accurate device especially designed for the single purpose of testing compression springs has been placed on the market by Link

PRECISION BORING



Easy and Economical with
Flynn Micrometer
Boring Heads

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ALL ALLOY PORTABLE SHEARS

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Two Sizes

No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to ¼" steel plate.
Special Blades for shearing stainless steel.

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VARIOUS WIDTHS
and GAUGES



BUTTS AND
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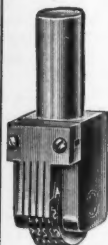
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S & S MACHINE WORKS

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CASES
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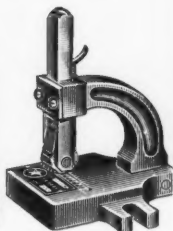
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Stamp in perfect alignment.
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Prices.



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Speed up production . . . the right file for the job will save time and money. Alligator Brand Files are available in a complete line of American and Swiss Patterns in all shapes, sizes and cuts to fit every filing need. Passing the highest tests, as to shapes, cutting quality and uniform hardness, they are guaranteed perfect in every detail. Write for catalog and prices.



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The Box You Want Is Always "On Top" -with STACKRACKS



STACKRACKS save time spent piling and un-piling boxes of stock. Every box is always accessible in these individual racks of heavy steel that lock together into a unit of any size or shape. Shop boxes slip into them like drawers in a file cabinet.

STACKRACKS are built to any size to fit your shop boxes. They are assembled into units without using any tools. No matter how high they are stacked or how heavy their load, the patented construction of STACKRACKS assures a positive lock which holds the units tightly together. They are built of channel and formed steel, strongly welded and finished in baked-on enamel.

Send the coupon today for the whole story of STACKRACKS. It costs you nothing to find out how STACKRACKS can help you.

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*"Stacked and
still accessible"*

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Stackbin Corp., 53 Troy St.
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Send me information on STACKRACKS.

The size of my boxes is.....

Name

Firm

Address

HAND PUMPS

ROTARY TYPE
Hundred-and-one uses!—pumping from drums and barrels, handling lube oils, paints, core oil, etc. Spout threaded for attaching hose or pipe. "Bucket" design provides **AUTO-MATIC** take-up for wear. Built for life-time service.

14 DIFFERENT MODELS
Capacities to 20 gallons per minute—Priced Right!

Blackmer Pump Co.
1815 Century Ave.
Grand Rapids, Mich.

TAKES UP IT'S OWN WEAR

EASY TURNING

NO PRIMING

20 FT. LIFTS

FAMOUS "BUCKET" DESIGN

SEND FOR FREE BULLETIN

ORDER BEFORE THEY GO

NESTING TYPE 10ga. Steel

BRAND NEW TOTE PANS 20 X 12 X 6

LOTS OF 50 \$1.00 each

LOTS OF 100 and 200 less 3%, 300 up less 5%

J. L. LUCAS & SON, INC.
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BROACHING SPECIALISTS

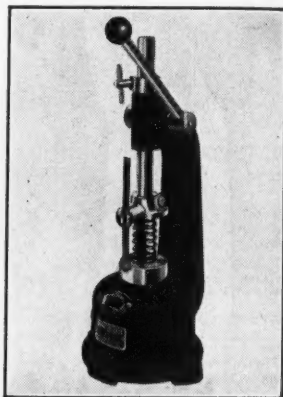
Fully equipped to fill your needs in all kinds of broaches. Let our experienced engineers solve your broach problems. Send drawings.

DETROIT BROACH CO.
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DETROIT, MICH.

BROACHES

Engineering & Mfg. Co., 1056 W. Baltimore Ave., Detroit, Mich. The checker is made in two sizes: the No. 1, which has a 50-lb. capacity and is calibrated in ¼-lb. units, and the No. 2, with a capacity of 250 lbs. and calibrated in 1-lb. units. The checker is simple to operate; the operator simply places the spring in the machine, pulls a lever, and obtains an accurate reading on the scale and dial, which show the length and pressure.

All essential moving parts act in a



Link Spring Checker

straight line, enabling the checking of springs to be done with the utmost rapidity. The weighing table is mounted on centrally located pilot-shaft ball bearings, eliminating friction and lateral movement. This is essential for direct pressure reading. Overloading is prevented. When the maximum capacity is reached, the weighing unit is relieved of further load. The accuracy of the checker is guaranteed closer than the government requirements.

Motion Picture Dramatizes Lubrication in Modern Industry

A unique motion picture dramatization of lubrication methods in modern industry, one of the most comprehensive studies of its kind ever attempted, was shown for the first time recently in the preview theatre of Radio City Music Hall, Rockefeller Center, New York. More than 100 representatives of the trade press saw the first public screening of the new film as guests of P. M. Gordon, Manager of the Indus-

trial Department of the Socony-Vacuum Oil Company, producers of the picture.

The new film, called "The Inside Story," is done in a "March of Time" style. Unusual animated drawing and striking photography are used to illustrate correct lubrication of various types of machinery. A microscopic film of oil assumes the hero's role in this industrial drama. But for this film of oil, the picture points out, many of the common daily conveniences of modern life, now within the reach of millions of people, would never have been possible.

The story of the fundamentals behind correct lubrication is told by showing bearings, gears and cylinders—the essential elements of all machines — and demonstrating how they operate, how they are lubricated and the lubrication needs of various types.

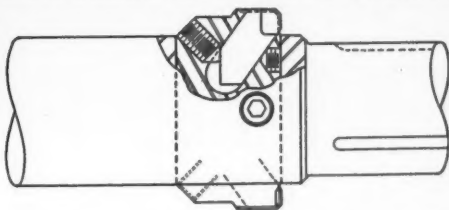
After a quick review of the field of industrial and mechanical progress, presented in effective photo-montage, the film demonstrates the need of lubrication to protect moving parts. The spectator sees the results of friction when two highly polished surfaces move on each other. Micro-photographs, enlarged until they cover the whole screen, show the reasons for friction, the fact that even highly polished surfaces are covered with hills and dales which the unaided eye cannot see. Various bearings are then shown and an animated drawing shows just what goes on inside, how lubrication prevents metal to metal contact.

In a similar way, the lubrication of gears is illustrated with animated drawing showing how a gear transmits power and how the lubricant provides protection.

Another series of pictures shows the work that correct lubrication does in protecting the moving parts of various prime motors—the Diesel engine being selected as an example. Animated drawings make clear the principle upon which the engine operates and the manner in which explosions are translated into usable power. Further drawings illustrate what a lubricant must do if efficient operation is to be maintained.

DAVIS BORING TOOLS

ELIMINATE ALL GUESS WORK!



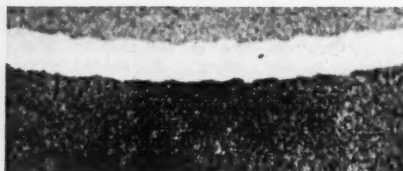
In this remarkable new Davis Boring Tool, note how the cutters can be adjusted independently, while the block is locked in the bar! This saves operating time—means more accurate adjustment of cutters—eliminates complicated set ups—reduces grinding to sharpening—positively eliminates all guess work, and literally brings about 100 per cent accuracy and efficiency!

Let Us Design a Tool Like This for You

DAVIS BORING TOOL CO., INC.

ST. LOUIS, MO.

The new film will be shown to business organizations and to groups of plant managers and factory executives in industrial communities throughout the country. Production of this film is



Microphotograph (from Socony-Vacuum film) of the surfaces of a bearing and journal. Note that even these highly polished metal surfaces are covered with tiny hills and dales not discernable to the naked eye. Were these two metal surfaces to make direct contact, the tiny hillocks would resist each other, slow the mechanical action, and cause wear. A thin film of oil, indicated by the white line, keeps the two metal surfaces from touching and thus reduces friction to the minimum.

Socony-Vacuum's answer to a growing demand among plant managers for a simple, complete and straight-forward discussion of the subject of industrial lubrication.



Rotary Files

**HIGH SPEED STEEL
HAND CUT--ALL SHAPES**

SEND FOR ILLUSTRATED 10th Anniversary Catalog—showing multitude of styles, shapes and cuts.

**THE ROTARY FILE COMPANY
STRATFORD CONN.**

Crucible Spot Steel Stock Book. This booklet, now being distributed by Crucible Steel Company of America, Dept. MS, Chrysler Bldg., New York, N. Y., gives complete listings of alloy and machine steels, and more than fifty brands and grades of tool and high speed steels—spot steel which is available for immediate delivery. Included in the booklet, which contains more than ninety pages, are tables, weights, measures, and other valuable information. Copy free upon request. Please indicate whether you want the Atlantic Seaboard, Central or Western Edition.

Bulletin No. 6165, issued by Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill., describes the F-M line of duplex, self-oiling pumps for handling mud and slush, clear water, petroleum products and other liquids.

These sturdy pumps are offered as basic units; for belt drive; and with top-mounted or tandem-mounted motors. They are available with capacities from 23 to 94 gallons per minute and with pressures up to 475 lbs. per square inch.

The bulletin, in a sectional view, points out and describes those construc-



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GEARS**

**ALL TYPES . . .
ALL MATERIALS**

Quickly and accurately made to any specification when you come to
DIEFFENDORF

For your gear requirements.

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Syracuse, New York**

NICHOLSON EXPANDING MANDRELS



They act as internal chucks for holding work while being machined on lathes, millers, grinders or shapers. Made in 14 different sizes, taking bores of every fractional part of an inch from $\frac{1}{8}$ " to 7". Sold either singly or in sets. Bulletin 530.



CONTROL VALVES in 2, 3 and 4 Way Types for operating single and double acting air, steam, water or oil cylinders, made in Lever, Foot, Solenoid and Motor Styles, for pressures up to 300 lbs. Hydraulic Valves lever operated up to 2000 lbs. Other products—Arbor Press, Flexible Couplings, Steel and Stainless Steel Ball Floats, Steam Traps, Steam Separators, High Pressure Air Vents.

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tion features that contribute to excellent, dependable performance under severe conditions. The different construction features and materials with which these pumps are available make them adapted to many service demands. Copy free upon request.

1937 Electric Motor Bearing Catalog. For the busy man who is responsible for the selection and installation of Electric Motor Bearings, the Johnson Bronze Company, New Castle, Pa., has just released a new complete catalog for 1937—Johnson Electric Motor Service Bulletin EM-7.

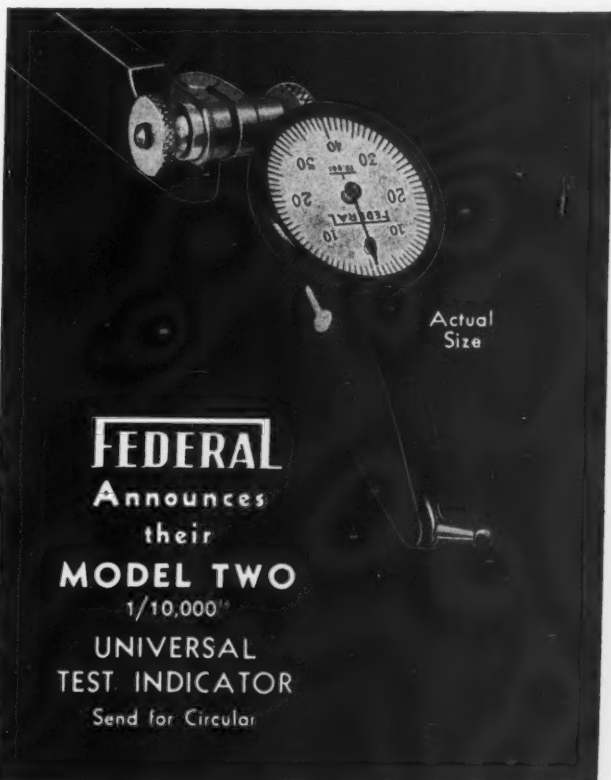
This valuable Bulletin is an indispensable guide to the bearing user and is complete in every detail. Over 200 Electric Motor Bearings are individually illustrated and described with necessary specifications throughout. For convenience and easy reference Alphabetical Progressive and Numerical Size Listings including bearings for any type motor are incorporated.

Other important features of this new Bulletin EM-7 are the sections on Johnson Universal Bronze Cored and Solid Bars; Hexagon Bars; Johnson Lead-Base and Tin-Base Babbitt; Johnson General Purpose Phosphor Bronze Bearings.

Interested parties may secure this valuable informative Bulletin EM-7 by writing directly to the Johnson Bronze Company, New Castle, Pa., or to this publication. The Johnson Bronze Company also offers an unusual consulting service through a competent staff of engineers and metallurgists available at

all times in solving bearing problems.

Taps: How to Choose and Use Them. This 12-page folder has been published by Union Twist Drill Co., Butterfield Division, Derby Line, Vt., to answer the many questions that have been asked in the past regarding the best style of tap for the various purposes, the best type of tap for use in various materials and why different lubricants should be used on different kinds of tapping jobs. This treatise will be valuable to everyone who buys or uses taps. Copy free upon request.



Actual Size

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Announces
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MODEL TWO
1/10,000"
UNIVERSAL
TEST INDICATOR
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1144 EDDY STREET, PROVIDENCE, R. I.
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Abrasive Wheels Grind Carbide, Widia and Other Tungsten Carbide Tools. This eight-page folder, now being issued by Abrasive Company, Tacony & Fraley Sts., Philadelphia, Pa., gives definite and clear-cut instructions for sharpening carbide tools. Beginning with a discussion of the two basic forms in which carbide tools are offered to industry, the text carries the reader through a series of descriptions in which he is told how the tool should be used in wet and dry grinding, the physical properties of a wheel for successful grinding of tungsten carbide,

the manner in which the tool should be fed across the face of the wheel, the grinding of forming and cut-off tools, wheel speeds, wheel dressing, and so on. A copy of this folder will be sent free upon request.

Gateco Precision Products. The line of rotary, jig and pilot bushings, boring bars, boring machines, and universal duplicators made by Glern & Anholts Tool Company, 1310 Mt. Elliott Ave., Detroit, Mich., are presented in a loose leaf catalog which is now being distributed by this company. Copy free upon request.

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for general machine shop and tool room use on dies, jigs, fixtures, and machined parts.

With the use of the die blue layout fluid, you do not have to polish the surface of work. Simply wipe surface fairly clean and brush on. DRIES INSTANTLY.

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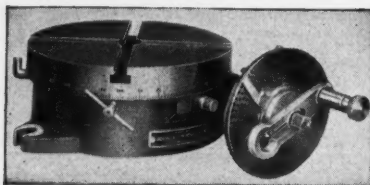
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"Handy & Harman Precious Metals Refining Service" is the title of a 12-page book describing and illustrating the facilities available at the Handy & Harman plant, Bridgeport, Conn., for melting and refining precious metals. This plant offers the advantages of laboratory methods which are said to be looked upon by many as the standard for comparison in precious metal assaying. Available to such customers are the services of a staff of expert chemists and metallurgists. Copy of this booklet free upon request.

Lyon Steel Shelf and Shop Boxes. An attractive new catalog on Steel Shop Boxes has just been published by Lyon Metal Products, Inc., Aurora, Ill. This new catalog completely illustrates and describes a wide range of steel boxes for every manufacturing and storage use—shelf boxes for the storage of small parts; shop and tote boxes for transportation of work in process by truck, conveyor or lift truck; stacking boxes, nesting boxes; and suggestions for the use of special steel containers designed to be used with specific production systems. In addition, the new catalog contains brief descriptive matter on Steel Shelving, Lockers, Shop Equipment and Tool Storage Equipment. Copy free upon request.

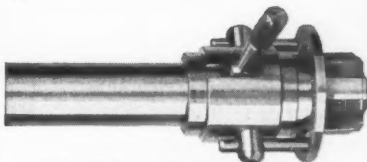
"Plain Bearing Motors Saved". Plain bearing motors which are inefficient in operation or whose bearings have failed are easily converted to the ball bearing type with the Fafnir Wide Inner Ring Ball Bearing Motor Cartridge, described in a new circular, "Plain Bearing Motors Saved", issued by The Fafnir Bearing Company, New Britain, Conn.

The circular points out that every motor user would like to enjoy the advantages of ball bearings: elimination of wear, maintained air gap, foreign mat-

ter excluded from bearings, no oil leaks into the windings, and low labor cost for lubrication. By actual test, the company states, a group of plain bearing motors demanded 142 repairs, operating over the same period of time and under the same conditions as an equivalent group of ball bearing motors, on which only six repairs were required.

Conversion is simple with the Fafnir Cartridge. The end-bell is bored out, and the cartridge is bolted or welded into place. The Fafnir Ball Bearing Motor Cartridge is supplied in 43 sizes, for shaft diameters from 13/16-in. to 3 1/2-in. Copy free upon request.

Murchev



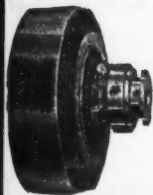
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STANDARD COLLAPSIBLE
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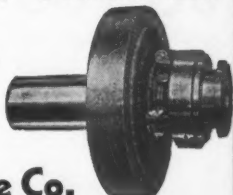
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Install this superior clutch on those hard or troublesome drives, and end clutch problems for good. Performs best because it is designed, and built best. Releases instantly at high or low speed, and can quickly be adjusted for liner wear.

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Williams Wrench Booklets. J. H. Williams & Co., 75 Spring St., New York City, announce the publication of two new booklets which will interest every buyer and user of industrial wrenches.

Booklet A-409 illustrates and describes Williams' full line of "Supersocket" Wrenches (Detachable Sockets); "Super-rences" (Chrome - Molybdenum); The "Superector", a new, heavy-duty, reversible ratchet wrench; "Non-Sparking" Safety Wrenches (Beryllium-Copper); and their two recently announced lines of Adjustable Wrenches.

Booklet A-81 describes the full drop-

forged Carbon Steel Wrench line—50 patterns, more than 1000 sizes. "Bull Dog" types and Screw Wrenches are also included. This booklet also lists The "Superector," Adjustable Wrenches, and "Non-Sparking" Safety Wrenches.

Copies may be obtained by writing the manufacturer.

Rotor Air Tools. A handsome 20-page book in color devoted to the air drills, reamers, screw drivers, nut setters, wood borers, grinders, buffers, sanders, wire brushing tools and other air operated equipment made by The Rotor Air Tool Co., Cleveland, Ohio., is now being distributed by this firm. Included are illustrations and descriptions of each of the tools mentioned, together with photographs of various jobs upon which these tools are shown at work. Copy free upon request.

Analysis of Shrinking Profit Margins. The discussion of this subject is presented on a 22x34-in. sheet, printed in color and including photographs and drawings illustrating the features and uses of the Monarch lathe and its accessories. The broadside is being distributed by The Monarch Machine Tool Company, Sidney, Ohio. The 28 illustrations include photographs of the Monarch-Keller form turning and boring machine, a close-up view of the Monarch Centro device (which makes it possible to turn, bore and face shapes other than round) in operation, jobs turned out on a Monarch lathe equipped with Centro device, the Monarch tool splash guard and rear necking turret, the Monarch Magnamatic all electric full automatic double carriage lathe, an 18-in. phantom view of a Monarch lathe showing the arrangement of the gears and bearings, and a line drawing of a typical Magnamatic set-up. Copy of this brochure free upon request to the above firm.



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DO YOU WORK FLAT SHEETS ?

Use Wales Individual, Self-Contained Hole-Punching & Notching Dies to cut costs, set-up time and the number of different dies required.

Re-locate for new parts—operate in press or press brake—standard holes up to $\frac{7}{8}$ " square notches up to 5 x 5—also Vee notches—in 14 gauge steel or under.

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THE STRIPPIT CORPORATION

Buffalo, N. Y.

High Intensity Mercury Lighting. A catalog describing many types of industrial lighting equipment for use with 200 and 400 watt high intensity mercury vapor lamps has been published by the Westinghouse Electric and Manufacturing Company. Combination mercury-incandescent units are also described. Included in the catalog is information on designing an installation, choosing mounting heights, spacing and size of units for different wall and ceiling conditions, and average resultant lighting intensity. Vapor proof units for severe service conditions are included. Copies of the catalog are available from the Lighting Division, Westinghouse Electric and Manufacturing Company, Cleveland, Ohio.

How to Plan a Materials Handling System. In this eight-page folder the Cleveland Tramrail Division of the Cleveland Crane & Engineering Co., Wickliffe, Ohio, classifies the various types of material handling equipment in an effort to be of assistance to the industrial executive in planning his material handling system. The factors which must be taken into consideration in the planning of a material handling system are presented together with suggestions regarding the selection of the correct type of equipment. The folder is profusely illustrated with pictures of the various types of material handling systems and equipment in operation so that the reader may be guided in selecting the equipment which will most nearly fit his needs. Copy free to any mechanical executive upon request.

GREENFIELD SMALL TOOL CATALOG No. 35. The complete line of small tools made by Greenfield Tap & Die Corp., Greenfield, Mass., is presented in this 384-page catalog. Among the tools illustrated and described in this catalog are taps, dies, twist drills, screw extractors, reamers, gages, screw plates, pipe tools, and other tools made by this firm.

The book is illustrated throughout with photographs and drawings of all the different kinds of tools and gages, and the text explains the uses for which each tool is specifically adapted. Tables of sizes, specifications and prices are included.

A supplement at the rear of the book contains 72 pages of tables and general information for mechanical engineers and machine shop executives. Copy free to any mechanical engineer, plant engineer or machine shop executive.



They are still good! Still good for extra service. All they need is a thorough Oakite cleaning. Yes, even your dirtiest, oiliest, greasiest rags can be made like new . . . softer, more absorbent, more usable than ever . . . by low-cost Oakite laundering.

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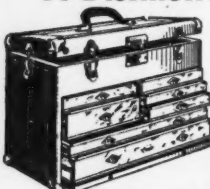
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Magnetic Relays: Bulletin 131 listing more than 100 relays for Heavy Duty (1 to 25 amperes) on D.C. and A.C. circuits. These relays are particularly adapted for transfer purposes.

The bulletin gives valuable coil and contact data, contact arrangements, dimensions and enclosures. Copy free by addressing Ward Leonard Electric Co., Mount Vernon, New York.

Pyramid Mouldings. Pyramid Metals Company, 455 North Oakley Boulevard, Chicago, Illinois, has recently issued a new catalog showing a variety of Stainless Steel Snap-On Mouldings for use in industrial design.

This catalog is rich in suggestions for the use of Stainless Steel Mouldings in decorative treatment on trucks, refrigerators, air-conditioned units, vending machines, furniture and many other items. Copies may be obtained by writing direct to the manufacturer.

Billings Drop Forged Tools. 39th Edition Catalog. This catalog, now being issued by The Billings & Spencer Company, Hartford, Conn., contains 48 pages, 8 1/2 x 11 in. in size, describing and illustrating the complete line of engineers', structural, machinists', automotive and other wrenches made by this firm, together with the Billings line of chisels, clamps, dogs, eye bolts, eye nuts, hammers, hoist hooks, pliers, punches, ratchets and parts, rod ends, screw drivers, tongs, vises and other tools made by this firm. Copy of this catalog free upon request.

JOHNS-MANVILLE INDUSTRIAL PRODUCTS. This 48-page book contains detailed descriptions and illustrations of insulation, packings, refractories, flooring, roofing and siding, their friction materials, transite pipe, and other products of Johns-Manville, 22 East 40th Street, New York, N. Y.

The sections which will be of interest to the metal-working plant executive are those which describe block and sheet insulation for heated surfaces, pipe insulation for high pressure heated steam lines, insulating cements, packings and gaskets, and high temperature insulating materials for use in the construction of industrial furnaces and ovens. Master mechanics in other industries than the metal-working industry will find special sections devoted to the different industries in which insulation materials are used.

July, 1937

Cochrane-Bly No. 14 Universal Vertical Miller-Shaper. A six-page folder which describes the No. 14 Universal Vertical Miller-Shaper made by Cochrane-Bly Company, Rochester, N. Y., is now being offered by that firm. The circular includes a list of the operations which can be performed on this machine and also a number of photographs showing various possible set-ups. Specifications for both duplex and single machines are given. Copy free upon request.

Sheffield Gages. This attractive 112-page catalog, now being distributed by Sheffield Gage Corporation, 1517 East 2nd St., Dayton, Ohio, describes and illustrates the line of precision gages made by this firm. The text is divided into sections under the following headings: Terminology, Visual Gages, Installations, Thread Plugs and Rings, Thread Ring Gage Holder, Measuring Wires, Cylindrical Plugs and Rings, Tapered Gages, Setting Plugs and Rings, Adjustable Limit Gages, Adjustable Limits Plugs and Snaps, Special Gages, Strainometer, Thread Lead Tester, Vibrometer, and Engineering Data.

Copy of the catalog free upon request.

Johnson "Quality" Phosphor Bronze Bearings, Bushings and Bar Bronze. This 32-page book, now being issued by Johnson Bronze Company, New Castle, Pa., includes descriptions, illustrations and specifications of the phosphor bronze general purpose bearings and bushings, graphite bronze bearings, electric motor bearings, bronze bars, and babbitt which are included in the products of this firm. Copy free to any mechanical executive.

Building a Career in Arc Welding. The spectacular growth of the art of joining metals by means of the electric arc has developed a real and definite need for men who are versed in this phase of metal fabrication. To interest intelligent young men in the possibilities of arc welding as a career, The Lincoln Electric Company, Dept. E-359, Cleveland, Ohio, has brought out a 10-page book presenting the possibilities of arc welding and outlining a course of instruction which is available to applicants at the Lincoln Welding School which is conducted by the above firm. Anyone interested can obtain a copy of this book without charge by writing The Lincoln Electric Company at the above address.



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Can be attached to Column Roring Bar, and Drilling or Milling Machine spindles. Single point tool travels radially, from center outward or reverse, feeds automatically, and covers faces 6" to 30".

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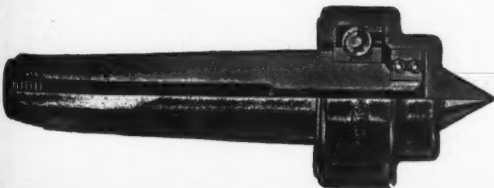
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It turns with the work. Eliminates friction of dead center.

Lowest possible overhang prevents vibration and chatter.

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Whitman & Barnes Decimal Equivalent and Tap Drill Size Chart. Illustrated herewith is a chart of decimal equivalent and tap drill sizes of wire gauge, letter and fractional size drills, which has been produced by Whitman & Barnes, 2108 Fort St., West., Detroit,

with figures $\frac{1}{4}$ in. and $\frac{3}{16}$ in. in height, making the chart clearly legible across a good-sized room. The thick board upon which the chart is printed insures against curling or easy damaging. For protection the chart is covered with cellophane and thus can be cleaned or washed without damage to the surface.

One of these charts is available, without charge, to any mechanical executive or tool buyer or supervisor who has actual need for a chart of this kind.

MINE SAFETY APPLIANCE COMPANY ISSUES AMMONIA MASK

Bulletin. A handsomely colored bulletin describing the new MSA Ammonia Masks for use in the servicing of ammonia refrigerating equipment has just been released by the Mine Safety Appliances Company, Meade, Thomas and Braddock Ave., Pittsburgh, Pa.

The new pamphlet contains actual photographs showing the MSA Ammonia Mask in use, and is available by writing this magazine, or addressing the Mine Safety Appliances Company as above.

Handbook of Common Machine Fasteners. This 20-page booklet, now being issued by Russell, Burdall & Ward Bolt & Nut Company, Port Chester, N. Y., has been designed to fit into the average drawing instrument case and was developed to be a part of the draftsman's equipment. The booklet includes 26 illustrations of the latest accepted standard method of drawing various types of bolts, nuts and rivets. This data is said not to have been assembled before in any single publication. Copy free upon request.

Congress Standardized Drives. This four-page folder, now being issued by Congress Tool & Die Company, Inc.

DECIMAL EQUIVALENTS AND TAP DRILL SIZES

OF WIRE GAUGE, LETTER AND FRACTIONAL SIZE DRILLS

(TAP DRILL SIZES BASED ON 75% MAXIMUM THREAD)

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1/64	80	.0156		9/64	37	.1406		23/64	U	.3594	
	79	.0148			36	.1340	10	3/8	V	.3750	7/16 14
	78	.0140			35	.1270			W	.3906	
	77	.0130		5/32	34	.1200		25/64	X	.3969	7/16 30
	76	.0125			33	.1130			Y	.4125	
	75	.0118			32	.1062			Z	.4219	1/2 18
	74	.0110			31	.1000	10	19/32		.4375	
	73	.0104			30	.0938		27/64		.4531	1/2 30
	72	.0098			29	.0875				.4688	
	71	.0092			28	.0812		15/32		.4844	9/16 12
	70	.0086			27	.0750		31/64		.5000	
	69	.0080		11/64	26	.0688	12	3/8		.5156	9/16 18
	68	.0075			25	.0625				.5312	5/8 11
	67	.0070			24	.0562		1/2		.5469	
	66	.0065			23	.0500		33/64		.5625	
	65	.0060			22	.0438	1/4	17/32		.5781	5/8 18
	64	.0056			21	.0375		19/32		.5938	
	63	.0052		3/16	20	.0312		35/64		.6094	
	62	.0048			19	.0250		9/16		.6250	
	61	.0045			18	.0188	1/4	37/64		.6406	5/8 18
	60	.0042			17	.0175		19/32		.6562	
	59	.0040			16	.0160		39/64		.6719	
	58	.0038			15	.0140		41/64		.6875	3/4 18
	57	.0036		13/64	14	.0125	1/4	21/32		.7031	
	56	.0034			13	.0110		43/64		.7188	
	55	.0032			12	.0100		11/16		.7344	
	54	.0030			11	.0090	5/16	23/32		.7500	
	53	.0028			10	.0080		45/64		.7656	7/8 9
	52	.0026			9	.0070		25/32		.7812	
	51	.0025			8	.0062		51/64		.7969	
	50	.0024			7	.0056	3/8	13/16		.8125	7/8 14
	49	.0022			6	.0050		53/64		.8281	
	48	.0020			5	.0045		27/32		.8438	
	47	.0018			4	.0040		55/64		.8594	
	46	.0016			3	.0035	7/8	15/8		.8750	
	45	.0015			2	.0030		57/64		.8906	1 6
	44	.0014			1	.0025		29/32		.9062	
	43	.0012				.0020	1 1/8	59/64		.9219	
	42	.0010				.0015		15/16		.9375	1 1/4
	41	.0009				.0010		61/64		.9531	
	40	.0008				.0008		31/32		.9688	
	39	.0007				.0006	1 1/4	63/64		.9844	1 1/2 7
	38	.0006				.0005				1.0000	

WHITMAN & BARNES

This chart, $18\frac{1}{2} \times 25\frac{1}{4}$ inches and printed on $\frac{1}{4}$ -inch board, free to mechanical executives or tool buyers.

Mich. The chart is printed in colors on a $\frac{1}{4}$ -in. thick board perforated at the top for hanging. The chart shows nominal and decimal dimensions of all standard drills of 1-in. diameter and under, including fractional sizes, letter size and wire size drills arranged in order of size. In addition, the chart shows National Standard tap drill sizes, both in fine and coarse thread.

The chart is $18\frac{1}{2} \times 25\frac{1}{4}$ in. in size,

the draftsman's equipment. The booklet includes 26 illustrations of the latest accepted standard method of drawing various types of bolts, nuts and rivets. This data is said not to have been assembled before in any single publication. Copy free upon request.

9030 Lumpkin Ave., Detroit, Mich., contains illustrations, descriptions and tables of specifications for the grooved pulleys, variable speed pulleys, V-step cone pulleys, round belt pulleys, crown face pulleys, and flexible couplings made by this firm. Copy free upon request.

Effect of Wheel Speed on Polishing Performance. This publication, No. 2 of Volume 28 of "Grits and Grinds," is devoted to a discussion of the most efficient speeds at which to operate the modern high speed grinding wheels. The text comprises practically a report of the conclusions which have been arrived at after a considerable amount of research and experimentation both in the laboratories of the Norton Company and other places. A chart shows the total cost per unit of metal removed with the wheels operating at various speeds from 4500 to 9000 r.p.m. Results of tests made for machine vibration at various speeds are also included. One page comprises a table of disc wheel recommendations in which the proper wheels are suggested for a wide variety

of work on materials of various kinds including aluminum, brass, bronze, carbon, cast iron, steel forgings, dies, porcelain, rails, springs, and so on.

Illustrations include views taken from the polishing departments of various industries, general view of Norton Company Research Laboratories, special equipment used in making tests, drying ovens used in the research laboratory, different types of wheels mounted for operation, and so on. Copy free by addressing Norton Company, Worcester, Massachusetts.

Catalog No. 8 and Reference Manual of Apex Screw Drivers and Bits. This booklet, now being distributed by The Apex Machine & Tool Co., 501 East 3rd St., Dayton, Ohio, contains complete information on all types of power and spiral screw driver bits to fit the various makes of electric, air and spiral screw drivers. The catalog should be of interest to any user of Phillips' recessed head or slotted head screws.

Copy free to any mechanical executive who will address a request on his business letterhead.

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Real opportunity and permanent position with long established, highest standing machinery manufacturer for high grade production man 35-40 who can get best out of men and good at training new men.

Must be graduate mechanical engineer, and good mechanic, with proven ability as leader and organizer in production work. Salary to start \$400.00 and bonus after three months.

Must know thoroughly machine shop, sheet metal and plate shop operations and preferably with foundry experience. Must be capable in due time of taking full responsibility for efficient and economical production. Our own organization have been advised of this ad.

Plant located in beautiful city of thirty thousand in Middle Atlantic States, employing 500 men and thoroughly modern in every way.

No consideration whatever will be given to applicants whose qualifications are in any way short of the requirements as fully enumerated above.

In your first letter, give age, education, places and period employed, duties, salary in each case, reason for changes and send photograph. All replies will be held in absolute confidence and no one communicated with until permission is granted.

ADDRESS REPLIES TO

MODERN MACHINE SHOP, 431 MAIN ST., CINCINNATI, O., BOX 311

Forsberg Catalog No. 37 of "Whale" and "Viking" Tools. This catalog, now being issued by Forsberg Manufacturing Company, Bridgeport, Conn., is made up of a series of loose leaf bulletins describing the complete line of hack saw blades, metal band saws, hack saw frames, Thorite mallets, screw drivers, micrometers, and other tools made by this firm. All tools are illustrated and the text includes tables of specifications with prices. Copy free upon request.

Brac-Kit First-Aid Kit For Industrial Use

A new type of Brac-Kit, a first-aid kit designed especially for industrial use, has been developed by the Davis Emergency Equipment Company, Graybar Bldg., New York, N. Y.

A special feature of the Brac-Kit is that the kit containing the first-aid supplies is firmly locked, with a dust-proof and water-proof seal, in an outer case, which can be permanently mounted in any convenient location. This permits Brac-Kits to be located at various points in plants, offices, and warehouses, on service trucks and buses, and other places where first-aid may be needed. If an accident happens, no time is lost hunting for first-aid supplies. With a twist of the wrist, the kit is unlocked and withdrawn and its contents are available for instant use. If, after use, the kit is mislaid, its absence will be promptly noted.

The kit holds ten unit-cartons containing dressings and treatments which can be selected to meet any needs. Provision is made for a wire seal to prevent unauthorized removal of supplies.

Gear Design Simplified. By Franklin D. Jones, 134 pages, 8½ by 11 inches; 201 illustrations. Published by The Industrial Press, 148 Lafayette St., New York City. Price, \$3.

This book consists exclusively of working rules, formulas, and data actually required by the designer and shop man in producing various types of gears. The theoretical side of gear design has been excluded, in order to condense and simplify the book. The types of gears dealt with include spur gears, internal gears, straight-tooth bevel gears, spiral-bevel gears, helical gears for parallel-shaft drives, helical (spiral) gears for angular drives, herringbone or double-helical gears, and worm-gears. There is also a section on the figuring of speeds and ratios, which includes various trans-

missions of the planetary type. Another section contains rules and formulas for determining the power-transmitting capacities of different types of gears.

All gear problems are presented in simple chart form. Each problem is illustrated by a drawing or diagram showing clearly the dimension or angle required. Directly opposite this drawing is the rule (and equivalent formula) for determining that particular dimension, angle, or other value. Then follows, in each case, an example showing exactly how the rule or formula is applied in actual practice. All gear problems throughout the book are presented in this way, and 201 drawings are used to illustrate the different classes of problems connected with the designing and cutting of gears. Whenever any problem has more than one solution or angle of approach, the different solutions are given, with the rules, formulas, and worked-out examples for each case.

This book explains the general application and advantages of different gear-tooth standards, such as the American standard 14½-degree and 20-degree full-depth involute systems; the American standard composite system; the different stub-tooth systems; and the standard module system employed in countries using the metric system of measurement. Tables of tooth parts covering a wide range of standard pitches give complete tooth dimensions for any diametral or circular pitch, including full-depth teeth and three stub-tooth standards. There is also a table of standard (DIN) modules with equivalent diametral and circular pitches, as well as the important tooth dimensions.

The dimension, angle, or quantity represented by letters used in the formulas, or the notation, will be found at the beginning of the book, and the same notation is applied to all classes of gearing so that there is never any doubt as to the meaning of a given letter or symbol. The following list of section headings indicates the general scope of this new book: Gear-Tooth Standards; Spur Gears—Full-Depth Teeth; Spur Gears—Stub Teeth; Internal Gearing; Bevel Gears for Right-Angle Drives; Bevel Gears—Angular Drives; Straight-Tooth Bevel Gears—Gleason System; Spiral Bevel Gears—Gleason System; Bevel Gears of Parallel-Depth Type; Helical Gears; Herringbone Gears; Worm-Gearing; Worm-Gearing—Module System; Gearing Ratios and Speeds; and Power-Transmitting Capacity of Gearing.

Applications of Pullmore Clutches. This 24-page book, now being distributed by Rockford Drilling Machine Division, Borg-Warner Corporation, 113 Catherine St., Rockford, Ill., presents the application of the Pullmore Clutch in a wide range of industries and mechanisms. Beginning with a description of the clutch and an explanation of the construction details, the book consists principally of photographs of machine tools, street sweepers, book binding machines, locomotive cranes, industrial trucks, and other types of machinery, the fullest advantages of which are made possible by the use of multiple disc clutches. Drawings in blue print color aid in familiarizing the reader with the design of the clutch as applied in these various instances. Copy free upon request.

"A Ten-Year Record of Apprentice Training" written by Stanley M. Brah and published by International Correspondence Schools, Scranton, Pa., explains how 34 industries in one district pooled public and private resources for the common and the public good—to launch and conduct an effective apprenticeship training program. The book

gives the results of 10 years of experience by these 34 industries in six different cities in the operation of an apprentice training program in coordination with the International Correspondence Schools. The industries with which the apprentices were connected furnished the practical applications of the lessons and the lessons were supplied by the I. C. S. Mr. Brah explains in detail how the lessons were coordinated with the shop work under the direction of classroom supervisors selected and appointed by the manufacturers and sums up the results obtained by this coordination method.

An interesting point brought out by Mr. Brah is the fact that many of the apprentices who completed the course satisfactorily were working in shops which were too small to afford a regular apprentice instructor. A number of letters from public school superintendents, officials of manufacturers' associations and executives of metal manufacturing plants where the system outlined has been used indicate that it is highly satisfactory. A copy of this book can be had by addressing D. C. Vandercook, Director, Personnel Training Division, International Correspondence Schools, Scranton, Pennsylvania.

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Carboloy Standard Blanks. This 28-page catalog now being issued by Carboloy Co., Inc., 2975 E. Jefferson Ave., Detroit, Mich., contains complete information on the set of three standard styles of Carboloy blanks which has been developed by this firm. The blanks are available in 100 sizes and are said to be adaptable for use on more than 90 per cent of all common machining applications. Copy free to mechanical executives upon request.

Dardelet Self-Locking Bolt & Nut Bulletin No. 16. This four-page bulletin, now being issued by Dardelet Threadlock Corporation, 55 Liberty St., New York, N. Y., describes and illustrates the design and application of the Dardelet Self-Locking Screw Thread and discusses the advantages, types, sizes and pitches, classes of fits and manufacturing tolerances, and economies of this type of thread. Copy free to mechanical executives upon request.

Wright Hoisting Equipment. One of the most complete catalogs on hoisting equipment that has ever been issued was recently announced by the Wright Manufacturing Division of American Chain & Cable Company, Inc., York, Pa. Engineers, materials handling men, shop superintendents and others in similar capacities will find this new publication a valuable addition to their files, as it is virtually a complete handbook on hoisting equipment.

In addition to complete specifications on Wright Hoists, Trolleys and Cranes, with special emphasis given to the Wright Improved Model High Speed Hoist, it includes suggestions on choosing a hoist as well as engineering tables on trolleys, cranes and I-beams. A special section is devoted to a description of Wright Electric Hoists. A new copy of this book will be supplied to those who use hoisting equipment.

Janette Blower Wheels Bulletin 24-2. This four-page bulletin presents a line of blower wheels for every application, now being manufactured by Janette Manufacturing Company, 550 W. Monroe St., Chicago, Ill. The wheels are designed specially for use in oil burners, coal stokers, gas burners, motorized

blowers, air conditioning equipment, and so on. Double inlet wheels are also available for slow speed applications.

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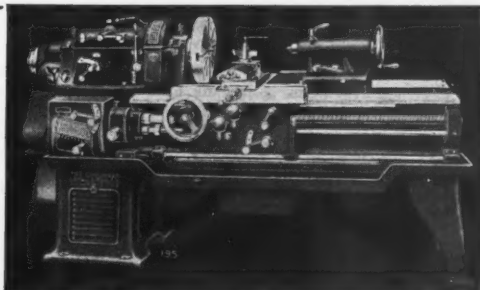
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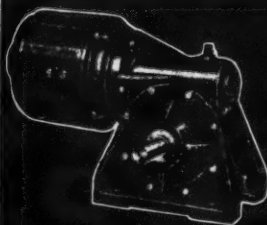
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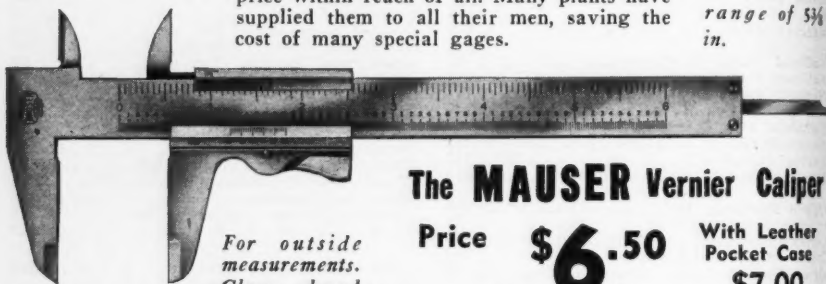
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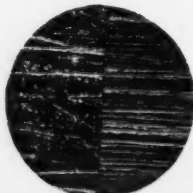
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